Anaerobic Digestion Facilities Processing Food Waste in the United States in 2015

Survey Results

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Author

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EPA would like to thank all the facility operators who provided data. This report is based entirely on information provided by all of you. The response rate to the survey was fantastic, especially considering that completion of the survey was voluntary. EPA greatly appreciates receiving this valuable data. In return, we hope that you find the information provided in this report to be useful.

This project would never have gotten off the ground without the outstanding technical support of David MacFarlane in EPA Region 3's Information Support Branch. David patiently and expertly assisted with the design and implementation of the electronic surveys.

Document Review

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Quality Assurance

EPA conducted a quality assurance review of the data and calculations used to generate the information in this report. This review was conducted by Sharon D. Kenny, Environmental Engineer, EPA Region 3's Environmental Assessment and Innovation Division. No errors or inconsistencies were found in the datasets.

Disclaimer

The anaerobic digestion facilities and their locations are provided for informational purposes only. Companies mentioned in this database are not certified or approved by US EPA. EPA does not guarantee the accuracy or completeness of this information.

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Executive Summary

In 2017, EPA surveyed U.S. operators of anaerobic digestion (AD) facilities that accept food waste to identify the number of facilities in the U.S. and their locations, and to learn about their operations. This report is the first of three annual data collections EPA will make through 2019. This first report covers data for calendar year 2015 and summarizes data received for three types of anaerobic digestion facilities: (1) stand-alone food waste digesters; (2) on-farm digesters that co-digest food waste; and (3) digesters at water resource recovery facilities (WRRFs) that co-digest food waste. Future reports will summarize data for 2016, 2017, and 2018.

EPA determined the number of AD facilities known to accept food-based materials[1] by reviewing publicly available information. Based on this research, EPA offered the survey to all facilities for which contact information was known. EPA also made the survey available on the Agency's website. EPA then confirmed the operational status of the facilities through direct contact with operators, a portion of which provided survey responses (Table ES-1).

Table ES-1: Number of Anaerobic Digestion Facilities Confirmed Operational, and Responding to Survey by Digester Type (2015)

Digester type	Confirmed Operational	Submitted Survey	Survey Response Rate
Stand-alone digesters	58	50	86%
On-farm digesters	18	15	83%
WRRF digesters	78	72	92%
Total	**154**	**137**	**90%**

Processing Capacity and Amounts in 2015

Based on data submitted by 137 survey respondents, the total processing capacity for food waste and food-based materials in all three digester types in 2015 was 15,809,647 tons per year and the total amount of food waste processed in all three digester types was 12,730,657 tons (Table ES-2).

Table ES-2: Total Capacity for Processing Food Waste and Total Amount of Food Waste Processed by Digester Type (2015)

Digester Type	Reported Capacity (tons per year)	Reported Amount Processed (tons per year)
Stand-alone digesters	12,563,687	9,828,081
On-farm digesters	210,754	112,879
Co-digestion systems at WRRFs	3,035,206	2,789,697
Total	**15,809,647**	**12,730,657**

[1] For the purposes of this report, food-based materials include, but are not limited to: food scraps that have been separated and collected by municipalities from residential sources; food scraps that have been separated and collected from institutions or venues (e.g., prisons, hospitals, stadiums); food scraps from food preparation at restaurants, cafeterias, and other food services; plate scrapings from restaurants, cafeterias, and other food services; fats, oils and greases (FOG); unused food collected from grocery stores (e.g., bakery items, bruised fruit, items past shelf life); and pre-consumer by-products of the food and beverage processing industries.

The total amount of non-food waste processed in all three digester types combined was 2,219,988,176 gallons and 461,723 tons (Table ES-3).

Table ES-3 Total Amount of Non-Food Waste Processed by Digester Type (2015)

Digester Type	Amount (liquid)	Amount (solid)*
Stand-alone digesters	34,341,130 gallons	134,757 tons
On-farm digesters	2,940,000 gallons	2,103 tons
Co-digestion systems at WRRFs	2,182,707,046 gallons	324,863 tons
Total	**2,219,988,176 gallons**	**461,723 tons**

Biogas Production

The total amount of biogas produced at digesters in 2015 was 358,742 standard cubic feet per minute (SCFM), equivalent to 1,117 MW installed capacity, 8.361 billion kWh per year, or enough energy to power 684,639 homes for a year.

Table ES-4 Summary of Biogas Data Reported by Digester Type (2015)

Digester type	SCFM*	MW	kWh/yr (million)	Number of homes powered for one year
Stand-alone digesters	9,176	29	216	17,781
On-farm digesters	1,979	6	45	3,704
Co-digestion systems at WRRFs	347,587	1,083	8,064	663,812
Total	**358,742**	**1,117**	**8,317**	**684,639**

* SCFM values are reported by facility operators and added together to get total SCFM for 2015 (358,742). The MW, kWh/yr, and homes powered numbers are calculated using the LMOP interactive conversion tool. These values are rounded to the nearest whole number, which accounts for the fact that the column totals may not sum.

These figures likely underestimate actual processing capacity, food waste processed, and biogas production because not all operational facilities provided a survey response, and EPA was not able to confirm if all identified digesters were operational (Appendix A lists operational digestion facilities and Appendix B lists additional digesters where operational data was not available).

Thirty-five states had at least one confirmed operating digester (Figure ES-1). States with ten or more confirmed operating digesters included California (30), Wisconsin (16), Ohio (13) and New York (13). Figure ES-2 shows the actual number of survey respondents by state.

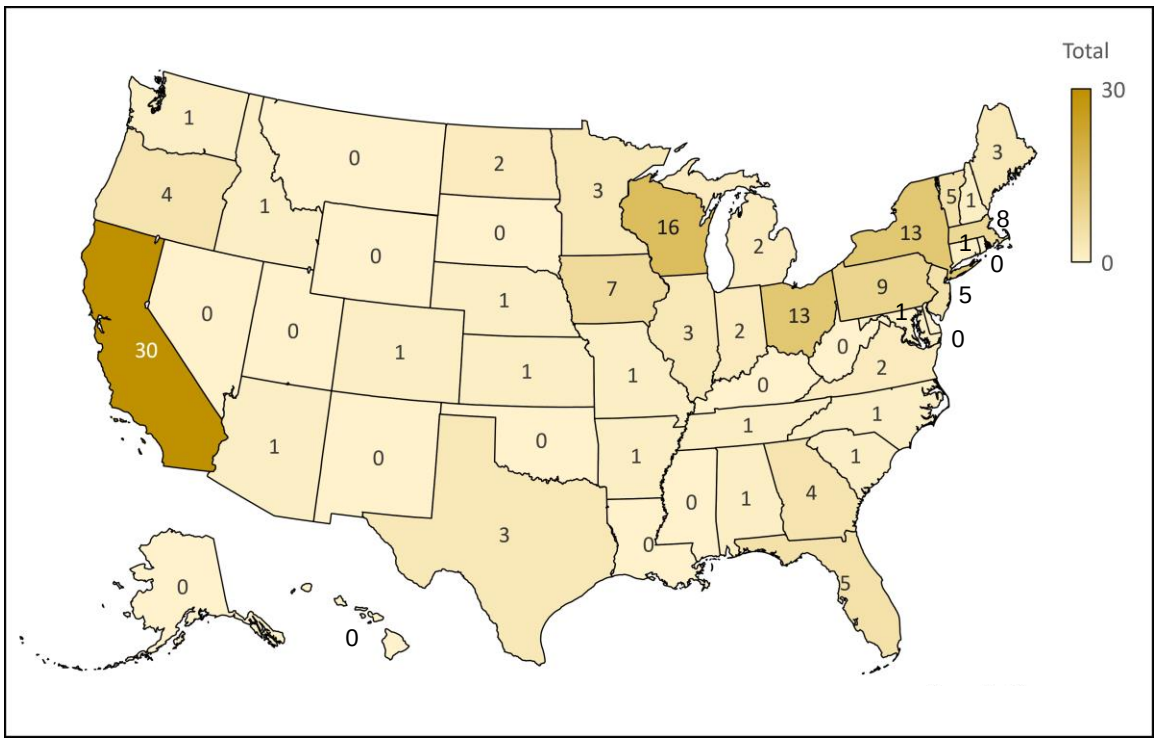

Figure ES-1: Confirmed Operating Food Waste Digesting Facilities by State (2015)

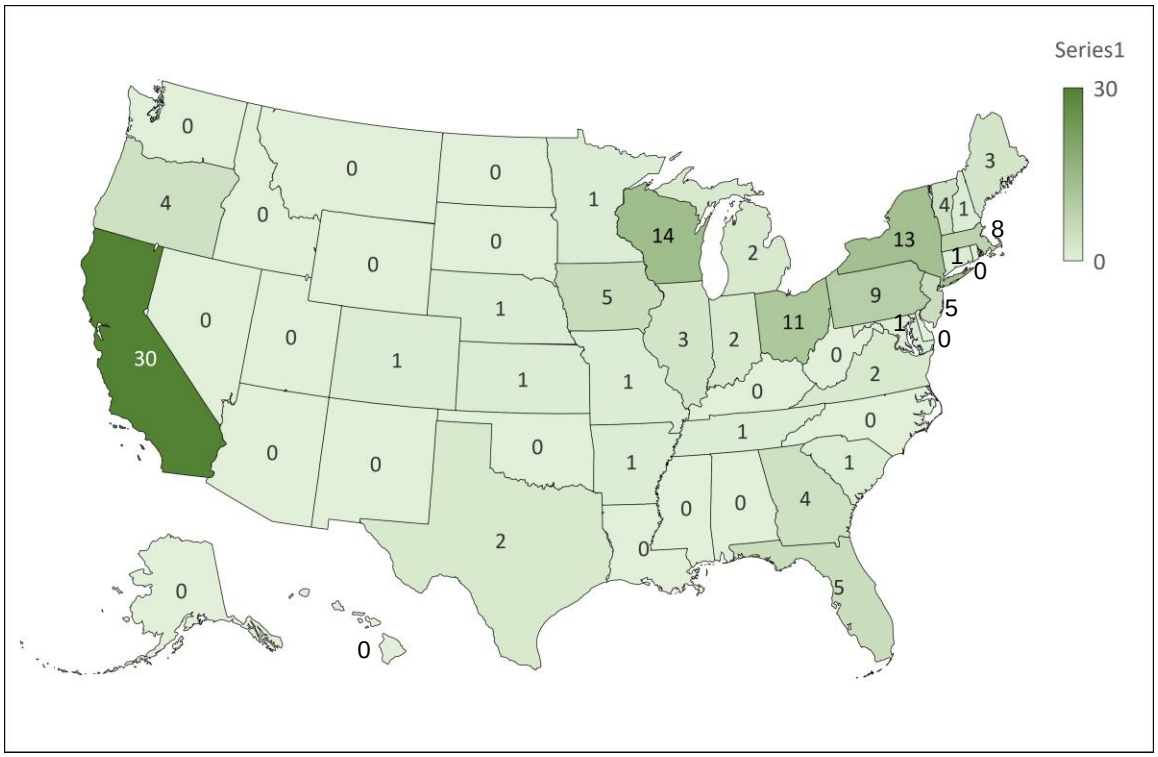

Figure ES-2: Survey Respondents by State (2015)

Operational Specifications and Pre-Processing Activity

In terms of operational specifications, the majority of digester types were found to be mesophilic and were wet digester systems. The top pre-processing/de-packaging activity for both stand-alone digesters and on-farm digesters was manual or mechanized de-packaging, and for co-digestion facilities at WRRFs, screening for debris or sorting.

Feedstock Sources and Types

Figure ES-3 aggregates the top five feedstock sources by digester type in 2015.

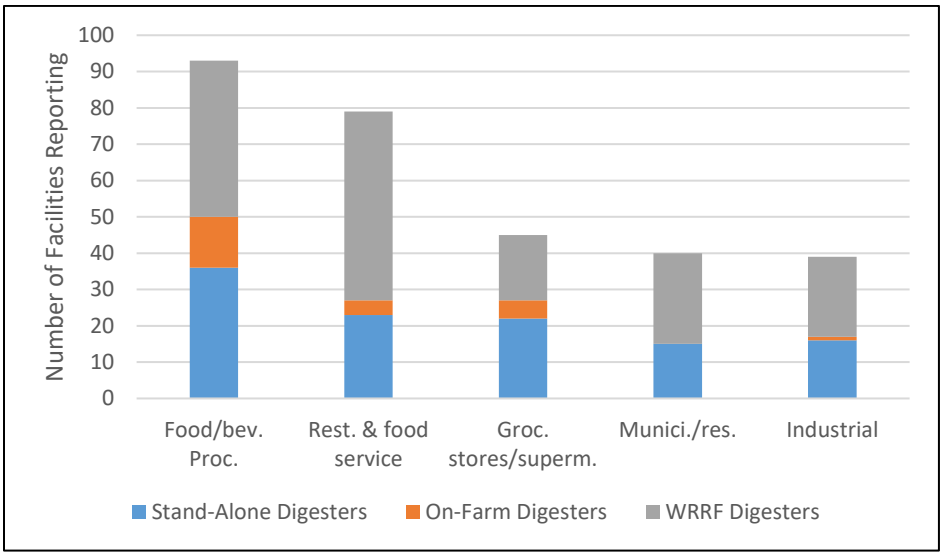

Figure ES-3: Top Five Sources of Digester Feedstock by Digester Type (2015)

Figure ES-4 aggregates the top five feedstocks accepted by digester type in 2015.

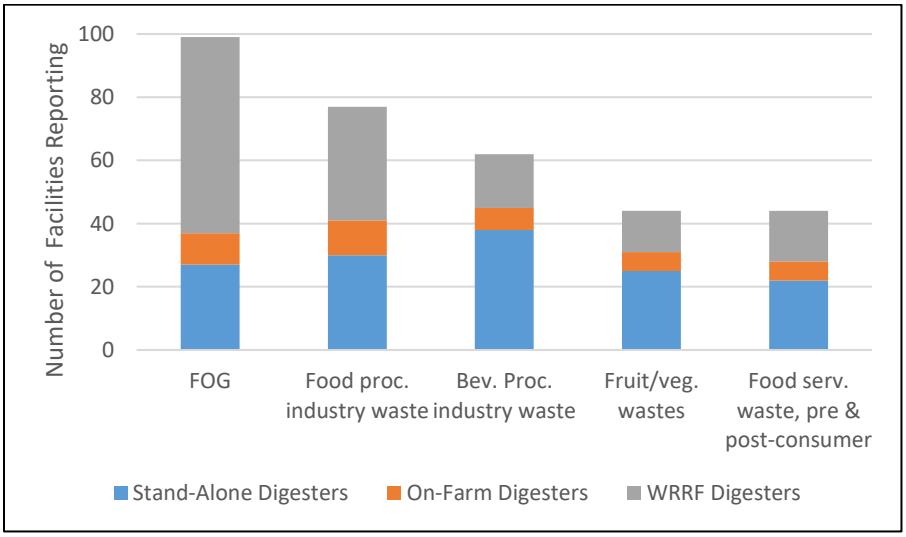

Figure ES-4: Top Five Feedstocks Accepted by Digesters Taking Food Waste by Digester Type (2015)

Biogas Uses and Cleaning Systems

Figures ES-5 and ES-6 provide information on biogas uses and cleaning systems. The top use of biogas among all three digester types was to produce heat and electricity (CHP). The next two highest uses of biogas for stand-alone digesters, on-farm digesters, and co-digestion facilities at WRRFs, respectively, were to produce electricity (sold to the grid), and to fuel boilers and furnaces to heat other spaces; to produce electricity (sold to the grid), and to produce electricity used behind the meter (including net metering); and to fuel boilers and furnaces to heat digesters, and to fuel boilers and furnaces to heat other spaces. Over 60% of all digester types reported that they utilize gas cleaning systems. The top constituents removed for all digester types overwhelmingly included moisture and sulfur. Another notable constituent removed with gas cleaning systems in co-digestion facilities at WRRFs were siloxanes.

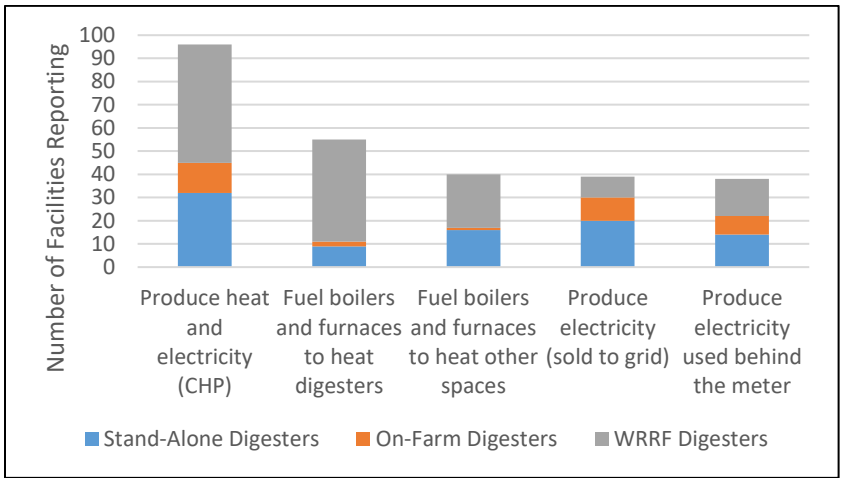

Figure ES-5: Top Five Uses of Biogas by Digester Type (2015)

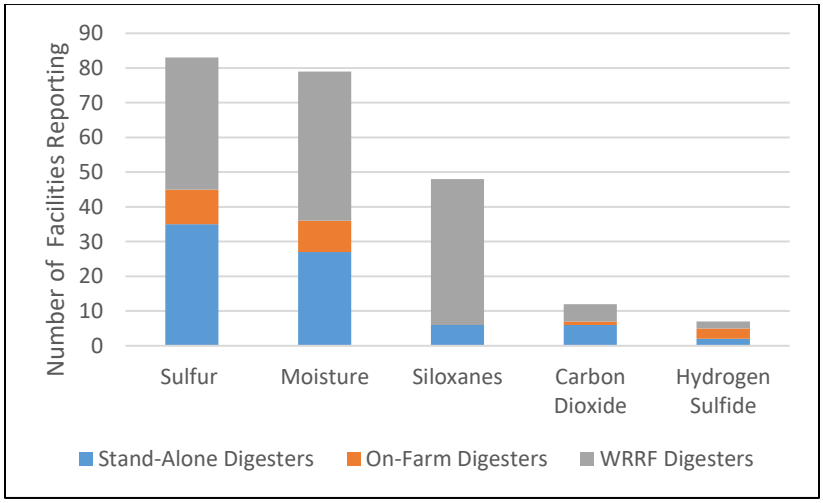

Figure ES-6: Top Five Constituents Removed by Digester Type (2015)

Solid and Liquid Digestate Uses

The top three solid digestate uses by specific digester type were:

- **Stand-Along Digesters**: Composted into a reusable/salable product, other, and de-watered/dried and land applied;
- **On-Farm Digesters**: processed into animal bedding, de-watered/dried and land applied, and composted into a reusable/salable product; and
- **WRRFs:** de-watered/dried and land applied, landfilled, and composted into a reusable/salable product.

The top uses of liquid digestate for stand-alone digesters, on-farm digesters, and co-digestion facilities at WRRFs, respectively, were: discharged to a wastewater treatment plant, reused as fertilizer via land application, and recirculated through the digester.

I. Background

In the United States (U.S.), food is the greatest fraction of material, by weight, in the municipal solid waste stream. In 2014, approximately 36 million tons of food from the residential, commercial, and institutional sectors was sent to landfills and combusted for energy, imposing significant economic and environmental costs.[2] To help alleviate these costs, the U.S. Environmental Protection Agency (EPA) encourages diversion of food waste from landfills, including to anaerobic digestion (AD) facilities.

In April 2014, EPA began building a database of names and locations of AD facilities processing food-based materials,[3] hereinafter referred to as food waste, to better understand more aspects of this universe (e.g., the current amount of food waste being processed by digesters, available capacity, etc.). EPA built the original database using publicly available information (e.g., American Biogas Council project profiles, BioCycle articles, EPA AgSTAR[4] database). To enhance the quality and quantity of available data, EPA was granted authority to collect information through a survey for digesters (see Appendix C for survey questions). The approval allows EPA to collect data annually for 3 years, from 2017 to 2019, and future reports will summarize data for 2016, 2017, and 2018. The survey itself requests information about operational characteristics of three types of digesters, and only for those which process food waste: (1) stand-alone food waste digesters; (2) on-farm digesters that co-digest food waste; and (3) digesters at water resource recovery facilities (WRRFs) that co-digest food waste.

As part of the research and analysis for this effort, EPA searched for other studies assessing the quantity and capacity of AD facilities in the U.S. EPA identified an August 2015 report by the Environmental Research and Education Foundation (EREF), based on 2013 data, entitled "Anaerobic Digestion of Municipal Solid Waste: Report on the State of Practice." The EREF report inventories the same three types of AD facilities in the U.S.: stand-alone AD facilities; on-farm co-digestion facilities; and digesters at water resource recovery facilities (WRRFs) that co-digest food waste. Therefore, EPA used the EREF facilities list to help develop the list of operating AD facilities that accept food waste, found in Appendix A of this document.

This report does not address whether the food waste processed at AD facilities could have been prevented, donated to feed people, or used to feed animals. This report quantifies the capacity for processing food waste, the amount of food waste processed at AD facilities, and additional relevant

[2] Advancing Sustainable Materials Management 2014 Fact Sheet, Table 1, page 8. Estimate includes residential, commercial, and institutional sources of food waste, but not industrial or on-farm sources.

[3] For the purposes of this report, food-based materials include but are not limited to food scraps that have been separated and collected by municipalities from residential sources; food scraps that have been separated and collected from institutions or venues (e.g., prisons, hospitals, stadiums); food scraps from food preparation at restaurants, cafeterias, and other food services; plate scrapings from restaurants, cafeterias, and other food services; fats, oils and greases (FOG); unused food collected from grocery stores (e.g., bakery items, bruised fruit, items past shelf life); and pre-consumer by-products of the food and beverage processing industries.

[4] AgSTAR is an EPA program that promotes the use of biogas recovery systems to reduce methane emissions from livestock waste. For more information see: https://www.epa.gov/agstar .

information for calendar year 2015. By the time food that may at one time have been recoverable is received by an AD facility, it is considered "food waste." Therefore, the term "food waste" is used throughout this document to describe the food waste or food-based feedstock being processed in digesters.

II. Survey Data Collection

Under ICR (No. 2533.01), EPA developed electronic data collection surveys for each digester type: stand-alone food waste digesters, on-farm digesters that co-digest food waste, and digesters at WRRFs that co-digest food waste. EPA emailed the surveys directly to digester operators and also made the surveys available on EPA's Anaerobic Digestion website. EPA collected data from January 2017 through the December 2017.

This data collection, which focused on the year 2015, allowed EPA to:

- Identify the number and location of AD facilities processing food waste;
- Document the total processing capacity at these AD facilities;
- Track the growth of processing capacity over time;
- Document the types of food and non-food wastes, and the sources of these wastes, that are accepted in AD facilities;
- Document how much food waste was processed;
- Document how much biogas was produced;
- Analyze the end-uses of AD products (biogas and digestate); and,
- Understand additional information about AD facilities such as tipping fees, pre-processing/de-packaging, operational specifications, and gas cleaning systems.

Completion of the survey was voluntary and the data collected was voluntarily reported by survey respondents. EPA identified the AD facilities included in this report using publicly available resources. Information that survey respondents submitted that was not publicly available (e.g., contact information, addresses, phone numbers) was not included in this report. EPA aggregated the technical data collected for each facility (e.g., processing capacity) and summarized it such that individual facility information could not be identified. Information received from individual facilities will be protected from disclosure in accordance with Freedom of Information Act confidential business exemptions and the Privacy Act of 1974.

III. Results

A. Location Data and Response Rates

EPA confirmed that 154 AD facilities processing food waste were operational. As described below, another 30 facilities are believed to operational, bringing the total operational (confirmed plus unconfirmed) to 184. Surveys were returned by 137 of the 184 total operational facilities (Table 1).

EPA's research also identified facilities that have ceased operations, are in the planning, design and construction phase, or did not advance beyond the pilot stage for a variety of reasons. See Appendix B for a list of these facilities.

Table 1: Number of Anaerobic Digestion Facilities Identified, Operational, and Responding to Survey by Type (2015)

Digester type	Operational (Confirmed)	Operational (Not Confirmed)	Operational (Confirmed + Non-Confirmed	Submitted Survey*	Survey Response Rate
Stand-alone digesters	58	3	61	50	82%
On-farm digesters	18	25	43	15	35%
WRRF digesters	78	2	80	72	90%
Total	**154**	**30**	**184**	**137**	**74s%**

Stand-Alone Digesters

Stand-alone digesters are primarily built to process food waste. While many of these digesters accept other organic materials (e.g., manure, wastewater solids), they are typically designed to process food waste. Stand-alone digesters are divided into two categories, as described below: multi-source food waste digesters, and industry dedicated digesters.

> **Multi-Source Food Waste Digester:** A digester that accepts and processes organic materials (feedstocks), often obtained from multiple sources. These digesters are typically designed to manage source-separated waste streams from a variety of sources including municipalities and institutions. Other sources of feedstock may include processing waste from the food and beverage industry, food waste from the food service or retail industries, or fats, oils, and grease (FOG).
>
> **Industry Dedicated Digester:** A digester that is typically developed adjacent to a food-or beverage- processing plant to process the waste from that plant. These digesters do not usually accept organic materials from outside sources.

EPA received 50 survey responses from a field of 61 operational stand-alone facilities for a response rate of 82%. The remaining 11 facilities did not submit data. EPA confirmed that eight of these 11 facilities are operational. The last three are believed to be operational. See Appendix A, Table 1A, for a list of all 61 facilities.

According to the survey responses received from the 50 operating stand-alone digesters: 28 are multi-source (56%); 20 are industry dedicated (40%); and two were identified by survey respondents as "other" (4%).

Operational stand-alone digesters are located in 24 states. See Figure 1 for a map and Table 2 for a list of operating stand-alone facilities (confirmed and non-confirmed) by state.

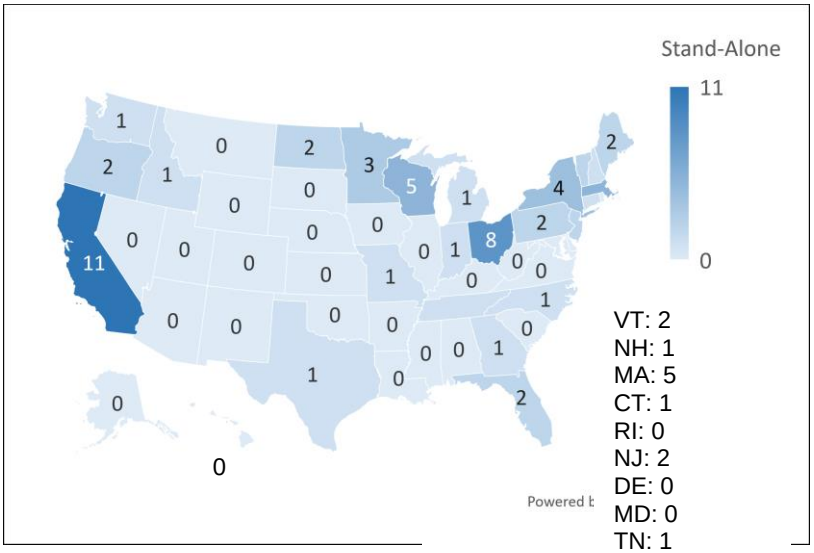

Figure 1: Operating Stand-Alone Food Waste Digesting Facilities by State (2015)

On-Farm Digesters

According to EPA's AgSTAR program, there are approximately 250 anaerobic digester facilities operating on livestock farms in the U.S. These digesters are primarily used for manure management. This survey targeted only those digesters that co-digested food waste. EPA received 15 survey responses out of the 43 operational on-farm digester facilities that are co-digesting food waste, for a response rate of 35%. The remaining 28 farms did not submit data. EPA confirmed that three of the 28 that did not submit data are operational. Information on the other 25 farm digesters was found in BioCycle Magazine articles, articles in other publications, American Biogas Council profiles, etc. As a result, these digesters are believed to be operational. See Table 2A in Appendix A for a list of all 43 farms and Figure 2 for a map of operating on-farm digesters (confirmed and non-confirmed) by state.

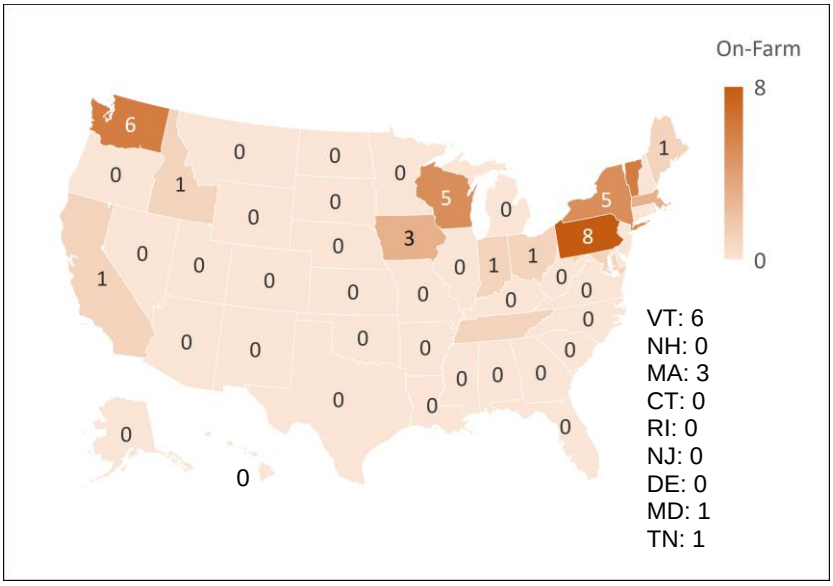

Figure 2: Operating On-Farm Food Waste Co-Digestion Systems by State (2015)

Operational on-farm digesters co-digesting food waste were located in 14 states. At the time that this data was collected, one farm co-digestion system in Vermont was in the planning, design and construction phase (See Appendix B).

Digesters at Water Resource Recovery Facilities (WRRFs)

The Water Environment Federation (WEF) and the American Biogas Council built and maintain a database (biogasdata.org) of information on WRRFs.[5] This database identifies approximately 1,200 WRRFs in the U.S. that have anaerobic digesters to manage wastewater solids, and roughly 20% of these facilities co-digest materials, including food waste, from offsite sources.

EPA received 72 survey responses from a field of 80 WRRFs with operational food-waste co-digestion systems for a response rate of 90%. The remaining eight facilities did not submit data. EPA confirmed that six of these eight facilities are operational. The last two are believed to be operational. See Table 3A in Appendix A for a list of all 80 facilities and Figure 3 for a map of operating WRRF food waste co-digestion systems (confirmed and non-confirmed) by state. WRRFs with operating co-digestion systems are located in 25 states.

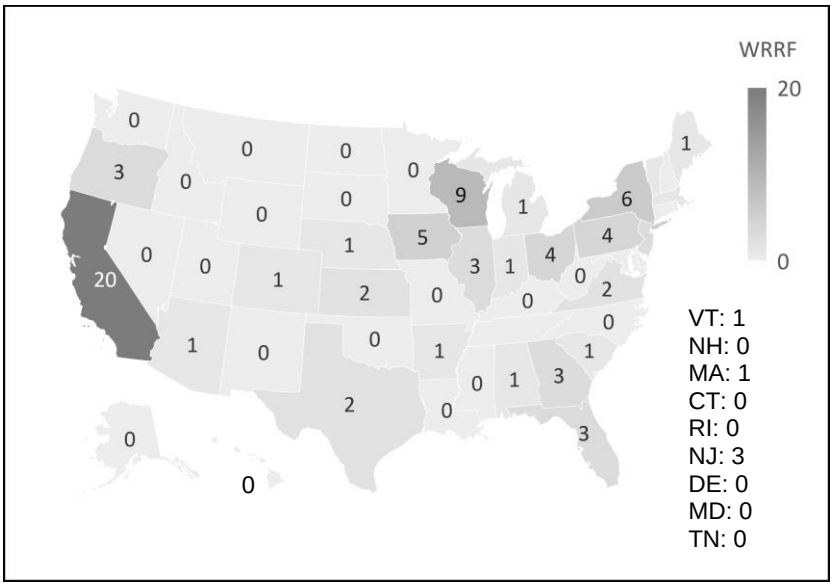

Figure 3: Operating WRRF Food Waste Co-Digestion Systems by State (2015)

Figure 4 and Table 2 summarize total operating digesters (confirmed and non-confirmed) by type and location. Note that not all operating facilities provided survey responses.

[5] Please see http://www.resourcerecoverydata.org/biogasdata.php for a listing of those WRRFs with operating AD.

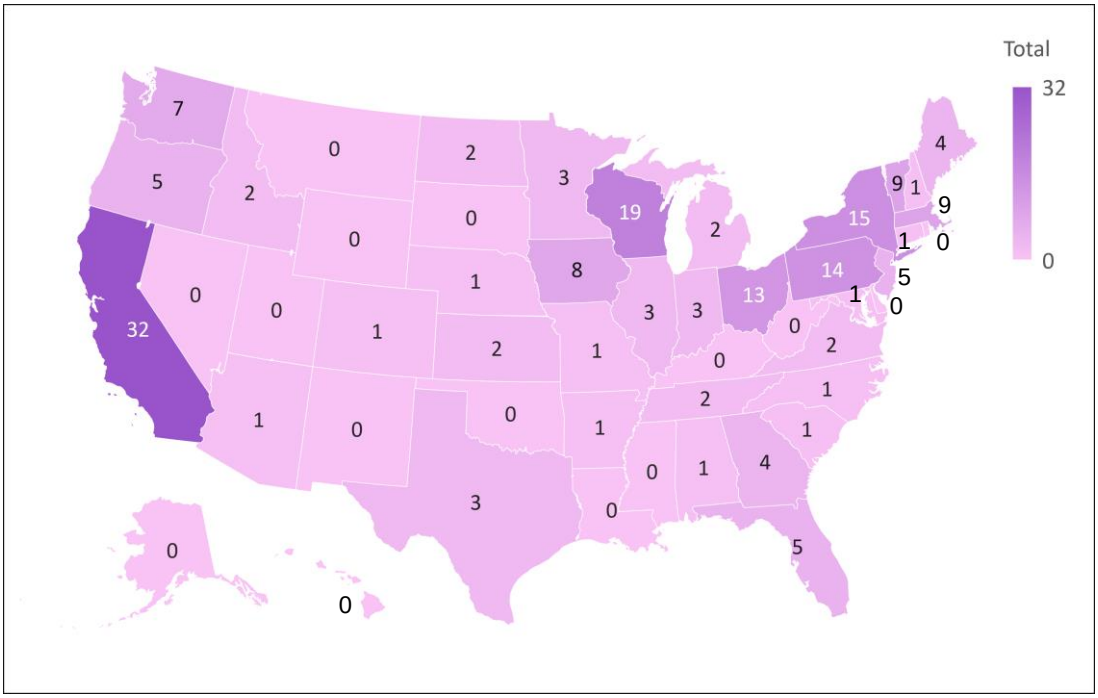

Figure 4: Operating Food Waste Digesting Facilities by State (2015)

Table 2: States with Operating Anaerobic Digestion Facilities (Confirmed and Non-Confirmed) by Facility Type (2015)

	Number of Facilities		
State	***Stand-Alone***	***On-Farm***	***WRRF***
Alabama	0	0	1
Arizona	0	0	1
Arkansas	0	0	1
California	11	1	20
Colorado	0	0	1
Connecticut	1	0	0
Florida	2	0	3
Georgia	1	0	3
Idaho	1	1	0
Iowa	0	3	5
Illinois	0	0	3
Indiana	1	1	1
Kansas	0	0	2
Maine	2	1	1
Maryland	0	1	0
Massachusetts	5	3	1
Michigan	1	0	1
Minnesota	3	0	0
Missouri	1	0	0
Nebraska	0	0	1
New Hampshire	1	0	0

	Number of Facilities		
State	***Stand-Alone***	***On-Farm***	***WRRF***
New Jersey	2	0	3
New York	4	5	6
North Carolina	1	0	0
North Dakota	2	0	0
Ohio	8	1	4
Oregon	2	0	3
Pennsylvania	2	8	4
South Carolina	0	0	1
Tennessee	1	1	0
Texas	1	0	2
Vermont	2	6	1
Virginia	0	0	2
Washington	1	6	0
Wisconsin	5	5	9
Total	**61**	**43**	**80**

B. Processing Capacity

Processing capacity refers to the maximum amount of food waste feedstock an anaerobic digester can accept per unit time. In this survey, that unit time was one year. EPA collected data on food waste processing capacity in either gallons or tons.[6] Capacity reported in gallons was converted to tons to quantify the total capacity available for processing food waste.[7] EPA recognizes that most anaerobic digesters typically process a liquid slurry. However, for food waste processing capacity, EPA converted the data from gallons per year to tons per year because tons is the industry standard for measuring food waste.

Based on a survey response rate of 95% for information about food waste processing capacity, EPA documented that the total capacity for processing food waste in all three digester types combined is 15,809,647 tons per year (Table 3). Note that the actual processing capacity is likely to be higher than the values reported in Table 3 because not all facilities known to be operating responded to the survey.

Stand-Alone Digesters

All 50 (100%) of survey respondents provided data on processing capacity. The total current processing capacity reported for food waste at stand-alone digesters in the U.S. is 12,563,687 tons per year.

[6] Throughout this document "ton" refers to a US ton, which equals 2,000 lb.

[7] The gallons to tons conversion for food waste was calculated based on a factor of 3.8 lbs/gallon. This factor comes from *Volume-to-Weight Conversion Factors*, USEPA ORCR, April 2016).

On-Farm Digesters

EPA asked operators of on-farm digesters to consider the following when calculating available food waste processing capacity:

> *Taking into account the average volume of manure from your livestock processed in your anaerobic digestion system, please identify the available capacity to co-digest other feedstocks.*

EPA's goal was to determine how much outside food waste feedstock could potentially be processed at on-farm digesters in the U.S. All 15 survey respondents provided data on processing capacity, which totals 210,754 tons per year. This number only represents 35% of the on-farm co-digestion systems potentially operating in the U.S. Therefore, the actual capacity is likely to be greater than this amount.

Digesters at WRRFs

Determining the capacity for WRRFs to co-digest food waste is more challenging because there are more factors to consider than just the size of the tanks. EPA asked plant operators to consider the following when calculating available food waste processing capacity:

> *Please identify your facility's available capacity to accept feedstocks from offsite sources for all digesters combined. When calculating this available capacity, please take into account the average volume of wastewater solids processed at your facility and the total capacity of your digesters. Assume that your facility has all the necessary equipment to receive additional feedstocks (e.g. a receiving station, storage, mixing equipment, etc.)*

Again, EPA's goal was to determine how much outside food waste feedstock could potentially be processed at WRRFs in the U.S. The data in this report directly reflects the information provided by the plant operators that responded to the survey. For operating WRRF co-digestion systems, 90% of respondents (65 out of 72) provided data on processing capacity. The total current processing capacity reported for food waste at co-digestion systems at WRRFs in the U.S. in 2015 was 3,035,206 tons per year.

Table 3: Total Capacity for Processing Food Waste via Anaerobic Digestion by Digester Type (2015)

Digester Type	Reported Capacity (tons per year)	Mean (tons per year)	Median* (tons per year)	Respondents Providing Data	Total Surveys Received
Stand-alone digesters	12,563,687	251,274	45,000	50	50
On-farm digesters	210,754	14,050	7,600	15	15
Co-digestion systems at WRRFs	3,035,206	42,156	9,595	65	72
Total	**15,809,647**			**130**	**137**
* Amounts were reported by facility response					

C. Operational Dates

The general perception is that processing food waste via anaerobic digestion is a relatively new practice. Most of the facilities that provided data for this survey began operations well before 2015 (Figure 5). For co-digestion at WRRFs, the earliest start date reported was over 50 years ago (1966), and stand-alone digesters were not that far behind (1969). Twenty stand-alone and WRRF digesters began processing food waste in the 1980s and 1990s. In the early 2000s, AD of food waste and co-digestion of food waste with other waste streams started to become more prevalent in the U.S. The practice took a little longer to reach the farming sector. According to the survey responses received from farmers, co-digestion at farm digesters did not begin until 2005.

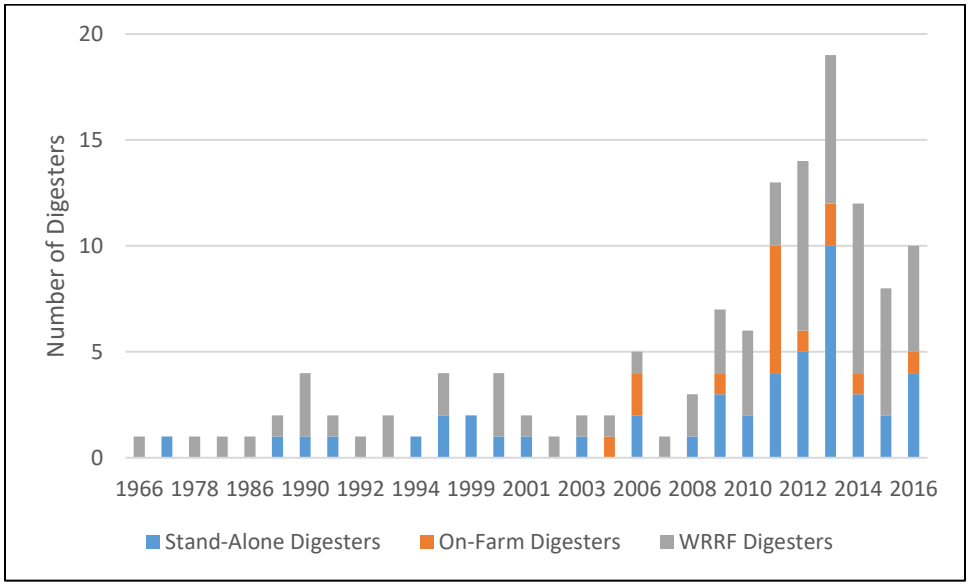

Figure 5: **Distribution of First Year of Digester Operation by Digester Type**

D. Food Waste Processed

EPA requested data on the amount of food waste processed via AD, reported in either gallons or tons. Capacity reported in gallons was converted to tons.[8] As with information about capacity, the amount of material processed is reported in tons because tons are the industry standard for measuring food waste. Note that the actual amount of food waste processed in 2015 was likely to be higher than the value reported in Table 4 because not all facilities known to be operating provided data. Projecting or predicting volumes processed at non-reporting facilities was not within the scope of this report.

Table 4: Total Amount of Food Waste Processed by Each Digester Type (2015)

Digester Type	Reported Amount Processed (tons)	Mean (tons per year)	Median* (tons per year)	Respondents Providing Data	Total Surveys Completed
Stand-alone digesters	9,828,081	189,002	13,361	41	50
On-farm digesters	112,879	6,640	790	14	15
Co-digestion systems at WRRFs	2,789,697	37,699	3,126	58	72
Total	**12,730,657**			**113**	**137**

* Amounts were reported by facility response

E. Non-Food Waste Processed

EPA also collected data on the amount of non-food waste processed via AD, in either gallons or tons. Non-food waste feedstocks include, but are not limited to: mixed yard waste, crop residues, manure, wastewater solids (sludge), septage, de-icing fluid, lab (or pharma) wastes, paper mill wastes, and crude glycerin. Given that the content of non-food waste feedstocks is highly variable and can be liquid or solid, there is no suitable conversation factor to combine values reported in different units. Therefore, both liquid volume and solid weight amounts reported by facility operators are presented in Table 5.

The scope of this project is limited to include only the non-food waste feedstocks at anaerobic digesters that digest food waste. It does not include documentation of non-food waste at facilities that do not process any food waste. For example, this project does not include the large amount of manure being digested at farm digesters that do not co-digest food, or the large amount of wastewater solids being digested in digesters at WRRFs that do not co-digest food. Therefore, the numbers below represent only a portion of non-food waste being digested in the U.S. The non-food waste data collected was intended to provide additional information about the types of wastes being processed via AD.

[8] The gallons to ton conversion for food waste was calculated using 3.8 lbs/gallon (See *Volume-to-Weight Conversion Factors*, USEPA ORCR, April 2016).

Table 5: Total Amount of Non-food Waste Processed by each Digester Type (2015)

Digester Type	Amount (liquid)	Amount (solid)*	Number of Respondents Providing Data	Total Number of Surveys Received
Stand-alone digesters	34,341,130 gallons	134,757 tons	23	50
On-farm digesters	2,940,000 gallons	2,103 tons	5	15
Co-digestion systems at WRRFs	2,182,707,046 gallons	324,863 tons	32	72
Total	**2,219,988,176 gallons**	**461,723 tons**	**60**	**137**

* Amounts were reported in liquid and solid units. Because there is no common conversion factor for non-food waste, these values are separated.

As mentioned previously, not all operational digesters provided data for this project. The actual amount of non-food waste processed at anaerobic digesters that digest food waste in 2015 is likely to be higher than the value reported above.

F. Feedstock Types

A wide variety of feedstocks are processed in digesters throughout the U.S. Some feedstocks are more common than others, which varies based on local availability, demand, and type of digester accepting the feedstock. Tables 6, 7 and 8 and Figure 6 show the types of food waste and non-food waste feedstocks processed at each of the three types of digesters. Figure 6 shows the top five feedstocks accepted by digester type. EPA did not collect data on the amount of individual feedstocks processed.

Feedstocks are classified as follows:

- **Food**: beverage processing industry waste; food processing industry waste; fats, oils, and greases (FOG); fruit/vegetative wastes; food service waste (pre- & post-consumer) retail food waste, rendering wastes and source-separated commercial, institutional or residential organic wastes.
- **Non-Food:** crude glycerin; manure; wastewater solids (sludge); septage; crop residues; mixed yard waste; de-icing fluid; lab (or pharma) wastes; paper mill wastes.

Respondents from 48 of the 50 stand-alone facilities, all 15 on-farm digesters, and all 72 WRRFs provided data on the type of feedstocks processed in 2015. Figure 6 indicates a summary of the top five food waste and non-food waste feedstocks for all digester types. The top five are: FOG, food processing industry waste, beverage processing industry waste, fruit/vegetable wastes, and pre-and-post-consumer food services waste.

Table 6: Types of Food Waste and Non-Food Waste Feedstocks Processed at Stand-Alone Digesters (2015)

Feedstock	Number of Stand-Alone Facilities processing this feedstock	Percentage of Stand-Alone Facilities processing this feedstock*
Beverage processing industry waste	38	79%
Food processing industry waste	30	63%
FOG	27	56%
Fruit/vegetative wastes	25	52%
Food service waste, pre- & post-consumer	22	46%
Retail food waste	17	35%
Source-separated commercial, institutional or residential organic wastes	17	35%
Crude glycerin	16	33%
Manure	16	33%
Wastewater solids (sludge)	11	23%
Rendering wastes	10	21%
Septage	6	13%
Other (please specify)†	6	13%
Crop residues	5	10%
Mixed yard waste	5	10%
De-icing fluid	2	4%
Lab (or Pharma) wastes	2	4%
Paper mill wastes	1	2%

* Percentage calculated based on the 48 facilities providing data on the type of feedstocks processed in 2015.

† Other reported feedstocks include dairy processing wastes, landfill leachate, and poultry processing waste.

Table 7: Types of Food Waste and Non-food Waste Feedstock Processed at On-Farm Digesters (2015)

Feedstock	Number of On-Farm Facilities processing this feedstock	Percentage of On-Farm Facilities processing this feedstock*
Food processing industry waste	11	73%
FOG	10	67%
Beverage processing industry waste	7	47%
Fruit/vegetative wastes	6	40%
Food service waste, pre- & post-consumer	6	40%
Retail food waste	4	27%
Source-separated commercial, institutional or residential organic wastes	3	20%
Crude glycerin	3	20%
Wastewater solids (sludge)	2	13%
Crop residues	1	7%
De-icing fluid	1	7%
Rendering waste	1	7%

* Percentage calculated based on 15 farms providing survey responses.

Table 8: Types of Food Waste and Non-Food Waste Feedstock Processed at Co-Digestion Systems at WRRFs (2015)

Feedstock	Number of WRRFs processing this feedstock	Percentage of WRRFs processing this feedstock*
FOG	62	86%
Food processing industry waste	36	50%
Septage	27	38%
Wastewater solids (sludge)	21	29%
Beverage processing industry waste	17	24%
Food service waste, pre- & post-consumer	16	22%
Fruit/vegetative wastes	13	18%
Crude glycerin	9	13%
Retail food waste	8	11%
De-icing fluid	7	10%
Rendering wastes	7	10%
Other (please specify) †	6	8%
Source-separated commercial, institutional or residential organic wastes	5	7%
Lab (or Pharma) wastes	1	1%
Manure	1	1%

* Percentage calculated based on 72 WRRFs providing survey responses.

† Other reported feedstocks include landfill leachate, poultry blood, non-toxic antifreeze, propylene glycol, and water soluble industrial polymer waste.

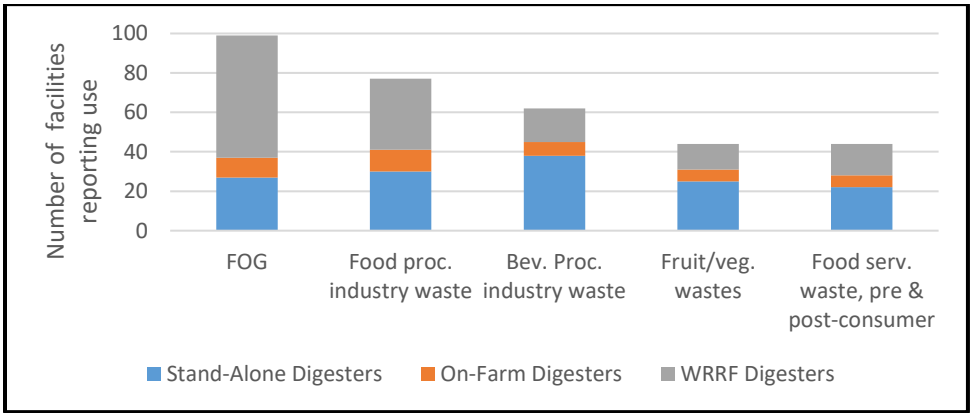

Figure 6: Top Five Feedstocks Accepted by Digesters Taking Food Waste by Digester Type (2015)

G. Feedstock Sources

Digester feedstocks come from many different locations, such as industrial, commercial, institutional, and residential sources. The survey question about feedstock sources directed respondents to identify all sources for the feedstocks that were received and processed at each facility. Some digesters have multiple sources and some have one or just a few. Tables 9, 10 and 11 show the number of facilities that reported receipt of feedstocks from each of the possible sources. Figure 7 shows the top five sources of

feedstock by digester type. Respondents from 48 of the 50 stand-alone facilities (96%), all 15 on-farm digesters (100%), and 71 of 72 WRRFs (99%) provided data on sources of feedstocks processed in 2015.

Table 9: Sources of Food Waste and Non-Food Waste Feedstock Processed by Stand-Alone Digesters (2015)

Source	Number of Facilities Receiving Feedstock from Specified Source	Percentage of Facilities Receiving Feedstock from Specified Source*
Food/beverage processors	36	75%
Restaurants and food service	23	48%
Grocery stores/supermarkets	22	46%
Biodiesel production	16	33%
Industrial	16	33%
Municipal/residential	15	31%
Schools	15	31%
Retail stores	13	27%
Livestock farms	12	25%
Sports and entertainment venues	12	25%
Wastewater treatment plants	12	25%
Corporate complex	10	21%
Hospitality	10	21%
Fruit/vegetable farms	7	15%
Prisons	6	13%
Airports	5	10%
Healthcare	5	10%
Laboratories/ pharmaceutical companies	5	10%
Farmers markets	4	8%

* Percentage calculated is based on 48 facilities providing data on feedstock sources.

Table 10: Sources of Food Waste and Non-Food Waste Feedstock Processed by On-Farm Digesters (2015)

Source	Number of Facilities Receiving Feedstock from Specified Source	Percentage* of On-farm Digesters Receiving Feedstock from Specified Source
Food/beverage processors	14	93%
Biodiesel production	5	33%
Grocery stores/supermarkets	5	33%
Restaurants and food service	4	27%
Hospitality	3	20%
Retail stores	3	20%
Corporate complex	2	13%
Healthcare	2	13%
Schools	2	13%
Airports	1	7%
Farmers markets	1	7%

Source	Number of Facilities Receiving Feedstock from Specified Source	Percentage* of On-farm Digesters Receiving Feedstock from Specified Source
Fruit/vegetable farms	1	7%
Industrial	1	7%
Prisons	1	7%
Wastewater treatment plants	1	7%
* Percentage calculated based on 15 farms providing survey responses.		

Table 11: Sources of Food Waste and Non-Food Waste Feedstock Processed by Co-digestion Systems at WRRFs (2015)

Source	Number of Facilities Receiving Feedstock from Specified Source	Percentage of WRRFs Receiving Feedstock from Specified Source*
Restaurants and food service	52	73%
Food/beverage processors	43	61%
Municipal/residential	25	35%
Industrial	22	31%
Other wastewater treatment plants	22	31%
Grocery stores/supermarkets	18	25%
Schools	15	21%
Biodiesel production	10	14%
Retail stores	10	14%
Corporate complex	7	10%
Airports	6	8%
Healthcare	6	8%
Hospitality	6	8%
Prisons	6	8%
Sports and entertainment venues	6	8%
Fruit/vegetable farms	5	7%
Laboratories/pharmaceutical companies	3	4%
Farmers markets	2	3%
Livestock farms	1	1%
* Percentage based on 71 WRRFs providing data on feedstock sources.		

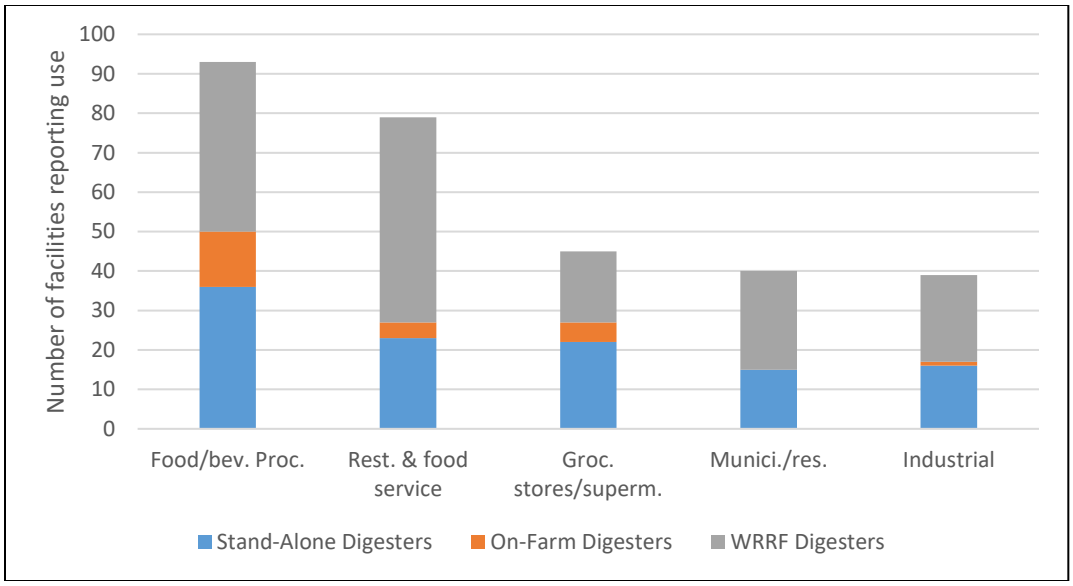

Figure 7: Top Five Sources of Digester Feedstock by Digester Type (2015)

H. Tipping Fees

Facilities can generate revenue through contracts to accept and process feedstocks through the use of tipping fees. Tipping fees can vary based on factors including, but not limited to: type of feedstock; regional landfill tipping fees; and availability of organics recycling options. EPA included survey questions about tipping fees to gain a better understanding of how digesters may be using them to offset capital expenditures and maintenance costs. EPA recognizes that tipping fee data may be considered proprietary and therefore made these questions optional as part of completing the survey.

Most survey respondents for all three digester types either did not answer the questions about tipping fees, or indicated "$0.00" or "prefer not to say," as the answer. Therefore, not enough information was collected to draw meaningful or useful conclusions about tipping fee trends in 2015.

I. Pre-processing/De-packaging

EPA asked operators about the types of pre-processing and de-packaging performed at their facilities. Respondents from 15 of the 50 stand-alone facilities, 6 of the 15 farm digesters, and 30 of the 72 WRRFs provided data on pre-processing/de-packaging of feedstocks processed in 2015. Multiple types of pre-processing or de-packaging can occur any one facility. Tables 12, 13 and 14 show the number of facilities that reported use of each type of pre-processing/de-packaging activity in 2015.

Table 12: Pre-processing/De-packaging at Stand-Alone Digester Facilities (2015)

Pre-processing/De-packaging Activity	Number of Facilities with Specified Pre-processing or De-packaging Activities
Manual or Mechanized De-packaging	10
Grinding and/or Maceration	6
Screening for Debris or Sorting	3
Third Party Processing	2

Pre-processing/De-packaging Activity	Number of Facilities with Specified Pre-processing or De-packaging Activities
Recyclable and Residue Removal System	1
Centrifugal Separation	1

Table 13: Pre-processing/De-packaging at On-Farm Digester Facilities (2015)

Pre-processing/De-packaging Activity	Number of Facilities with Specified Pre-processing or De-packaging Activities
Manual or Mechanized De-packaging	3
Third Party Processing	2
Grinding	1
Shredding	1

Table 14: Pre-processing/De-packaging at Co-digestion Facilities at WRRFs (2015)

Pre-processing/De-packaging Activity	Number of Facilities with Specified Pre-processing or De-packaging Activities
Screening for Debris or Sorting	14
Third Party Processing	11
Grinding and/or Maceration	8
Heating	5
Manual or Mechanized De-packaging	2
pH Adjustment	2
Pulping with a paddle finisher	1
Liquid/Solid Separation	1

J. Operational Specifications

EPA asked respondents to share information about the operational specifications of their digesters, including temperature range, and whether operations were wet or dry. The temperature ranges are typically 86 – 100^{o} F for mesophilic and 122 – 140^{o} F for thermophilic. Wet and dry classifications of digesters refer to the moisture content of the feedstocks. A wet digester generally processes feedstock with less than 15 percent solids content, whereas a dry digester generally processes feedstock with greater than 15 percent solids content.

Respondents from 48 of 50 stand-alone facilities (96%), all 15 on-farm digesters, and all 72 WRRFs provided data on temperature range. Respondents from all 50 stand-alone facilities and all 15 on-farm digesters provided data on whether their digester system was wet or dry. This question was not posed to WRRFs because all WRRF digester systems are wet. Tables 15 and 16 show the data for temperature range and wet versus dry facilities by facility type.

Table 15: Temperature Range Data for each Digester Type (2015)

	Temperature Range			Response Rate	
Digester Type	***Mesophilic***	***Thermophilic***	***Unheated***	***Number of Respondents Providing Data for this Survey Question***	***Total Number of Surveys Received in 2015***
Stand-alone digesters	30	8	10	48	50
On-farm digesters	12	2	1	15	15
Co-digestion systems at WRRFs	66	5	1	72	72
Total	**108**	**15**	**12**	**135**	**137**

Table 16: Data on Wet vs. Dry Systems for each Digester Type (2015)

	Wet vs. Dry Systems		Percentage		Response Rate	
Digester Type	***Wet***	***Dry***	***Wet***	***Dry***	***Number of Respondents Providing Data for this Survey Question***	***Total Number of Surveys Received in 2015***
Stand-alone digesters	46	4	92%	8%	50	50
On-farm digesters	15	0	100%	--	15	15
Co-digestion systems at WRRFs[9]	--	--	100%	--	--	--
Total	**61**	**4**			**65**	**65**

K. Biogas Production

Biogas production data was collected in, or converted to, standard cubic feet per minute (SCFM), which is the industry standard unit of measurement for biogas. Total biogas produced is summarized below as reported by facility type. SCFM was then used to estimate installed capacity in megawatts (MW), and generation potential in kilowatt-hours per year (kWh/yr) using methods described in the interactive conversion tool[10] on EPA's Landfill Methane Outreach Program (LMOP) website.[11] The LMOP interactive conversion tool assumes landfill gas is 50% methane. The calculation for SCFM landfill gas to MW capacity was revised for the purposes of this report to reflect that biogas tends to be about 60% methane. To provide a frame of reference, EPA presents the kWh/yr values for each type of digester in terms of powering homes.[12] Table 17 shows biogas production data by facility type.

[9] This question was not posed to WRRFs because all WRRF digester systems are wet.

[10] https://www.epa.gov/sites/production/files/2016-05/interactiveconversiontool.xls

[11] Anaerobic Digestion and its Applications, EPA, October 2015, page 9.

[12] The average home consumed 12,148 kWh of delivered electricity in 2016, the most recent date for which data is available (https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references).

Table 17: Summary of Biogas Data Reported by Digester Type (2015)

Digester type	Respondents providing data	Surveys received	SCFM*	MW	kWh/yr (million)	Number of homes powered for one year
Stand-alone digesters	43	50	9,176	29	216	17,781
On-farm digesters	12	15	1,979	6	45	3,704
Co-digestion systems at WRRFs	67	72	347,587	1,083	8,064	663,812
Total	**122**	**137**	**358,742**	**1,117**	**8,317**	**684,639**

* SCFM values are reported by facility operators and added together to get total SCFM for 2015 (358,742). The MW, kWh/yr, and homes powered numbers are calculated using the LMOP interactive conversion tool. These values are rounded to the nearest whole number, which accounts for the fact that the column totals may not sum.

L. Biogas Uses

Most facilities have more than one use for the biogas, and the survey permitted multiple responses. Respondents from 49 of 50 stand-alone facilities (98%), all 15 on-farm digesters, and all 72 WRRFs provided data on biogas uses. Table 18 summarizes the ways in which respondents reported using biogas produced and Figure 8 shows the top five uses of biogas produced at AD facilities as reported by each type of respondent.

Stand-Alone Digesters

The stand-alone digester survey asked respondents if the biogas produced was used onsite, sold, or both. The data reported show that in 2015, 62% used the biogas onsite, 10% sold it and 26% used it both onsite and sold it. The survey also asked respondents if they were able to utilize all the biogas produced at their facility. Eighty-two percent (82%) reported that all the biogas produced was used. Sixteen percent (16%) reported that they did not use all the biogas produced. Facilities that did not use all of the biogas produced uniformly reported that they flared the unused biogas.

On-Farm Digesters

The survey asked on-farm digester respondents if the biogas produced was used onsite, sold or flared. The reported data show that in 2015, 80% used the biogas onsite, 27% sold it, and 60% flared at least some of the biogas.

Digesters at WRRFs

The WRRF co-digester survey asked respondents if the biogas produced was used onsite, sold, or flared. The reported data show that 94% used the biogas onsite, 8% sold it and 63% flared at least some of the biogas. Two WRRFs out of 72 flared all of the biogas they produced. The survey also asked WRRF respondents if they utilized all the biogas produced at their facility. All 72 WRRFs provided data for this question. Exactly 50% of the facilities reported that they used all the biogas produced for onsite purposes. The other 50% confirmed that they flared the unused biogas.

WRRF operators also reported the following other uses, stated verbatim from the survey:

- Jacket water from generators heats the anaerobic liquid through a heat exchanger;

- Used exclusively by sludge pelletizing process;
- Fuel steam boiler to produce steam for Class A dryer operation;
- Absorption chiller, desiccant dehumidifier;
- Fuel for thermal drying; and
- Fuel for an off-site boiler.

Table 18: Uses of Biogas Produced at Anaerobic Digesters (2015)

	Stand-Alone Digesters		On-Farm Digesters		Co-Digestion Systems at WRRFs	
Biogas Use	***Number of Facilities Reporting Use***	***Percentage of Facilities using Biogas as Specified****	***Number of Facilities Reporting Use***	***Percentage of On-farm Digesters using Biogas as Specified†***	***Number of Facilities Reporting Use***	***Percentage of WRRFs using Biogas as Specified§***
Produce heat and electricity (CHP)	32	65%	13	87%	51	71%
Fuel boilers and furnaces to heat digesters	9	18%	2	13%	44	61%
Fuel boilers and furnaces to heat other spaces	16	33%	1	7%	23	32%
Produce electricity (sold to grid)	20	41%	10	67%	9	13%
Produce electricity used behind the meter (including net metering)	14	29%	8	53%	16	22%
Produce mechanical power	2	4%	2	13%	4	6%
Compressed to vehicle fuels: used for company fleet/personal vehicles	4	8%	0	--	0	--
Compressed to vehicle fuels: sold to customers	3	6%	0	--	1	1%
Renewable natural gas (processed in order to inject to pipeline)	2	4%	0	--	2	3%
*: Percentage out of the 49 facilities providing data on biogas uses.						
†: Percentage out of the 15 farms providing survey responses.						
§: Percentage out of the 72 WRRFs providing survey responses.						

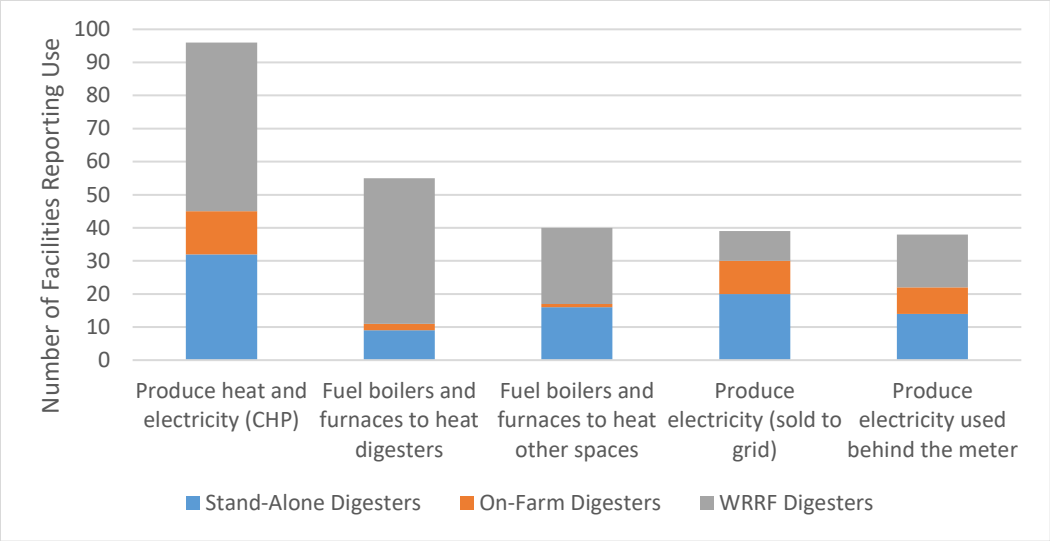

Figure 8: Top Five Uses of Biogas by Digester Type (2015)

M. Gas Cleaning Systems

All three surveys asked respondents whether they had a gas cleaning system (yes or no). Respondents from 49 of 50 stand-alone facilities, all 15 on-farm digesters, and all 72 WRRFs answered this question. The data reported show that in 2015 gas cleaning systems were utilized at 78% of stand-alone food waste digesters, 73% of on-farm digesters that co-digest food waste, and 65% of digesters at WRRFs that co-digest food waste.

All three surveys also asked respondents what constituents were removed by their gas cleaning systems. All 38 stand-alone facilities, 11 on-farm digesters, and 47 WRRF digesters with gas-cleaning systems provided data on the constituents removed by these systems. Table 19 summarizes the type and frequency of constituents removed by gas cleaning systems for each type of digester, and Figure 9 shows the top five constituents removed by digester type.

Table 19: Gas Cleaning Systems at Anaerobic Digesters (2015)

	Stand-Alone Digesters		**On-Farm Digesters**		**Co-Digestion Systems at WRRFs**	
Constituent	***Number of Facilities Reporting Removal of this Constituent***	***Percentage of Stand-alone Digesters with Gas Cleaning Systems Reporting Removal this Constituent****	***Number of Farms Reporting Removal of this Constituent***	***Percentage of Digesters at Farms with Gas Cleaning Systems Reporting Removal of this Constituent†***	***Number of WRRFs Reporting Removal of this Constituent***	***Percentage of Digesters at WRRFs with Gas Cleaning Systems Reporting removal of this Constituent§***
Sulfur	35	92%	10	91%	38	81%
Moisture	27	71%	9	82%	43	91%
Siloxanes	6	16%	0	--	42	89%
Carbon Dioxide	6	16%	1	9%	5	11%

	Stand-Alone Digesters		On-Farm Digesters		Co-Digestion Systems at WRRFs	
Constituent	***Number of Facilities Reporting Removal of this Constituent***	***Percentage of Stand-alone Digesters with Gas Cleaning Systems Reporting Removal this Constituent****	***Number of Farms Reporting Removal of this Constituent***	***Percentage of Digesters at Farms with Gas Cleaning Systems Reporting Removal of this Constituent†***	***Number of WRRFs Reporting Removal of this Constituent***	***Percentage of Digesters at WRRFs with Gas Cleaning Systems Reporting removal of this Constituent§***
Hydrogen Sulfide	2	5%	3	27%	2	4%
Compressed gas	2	5%	0	--	2	4%
Particulates	1	3%	0	--	1	2%
Oxygen & nitrogen	1	3%	0	--	0	--
VOCs	1	3%	0	--	0	--
*: Percentage calculated based on 38 stand-alone digesters providing data on constituents removed via gas cleaning systems.						
†: Percentage calculated based on 11 farms providing data on constituents removed via gas cleaning systems.						
§: Percentage calculated based on 47 WRRFs providing data on constituents removed via gas cleaning systems.						

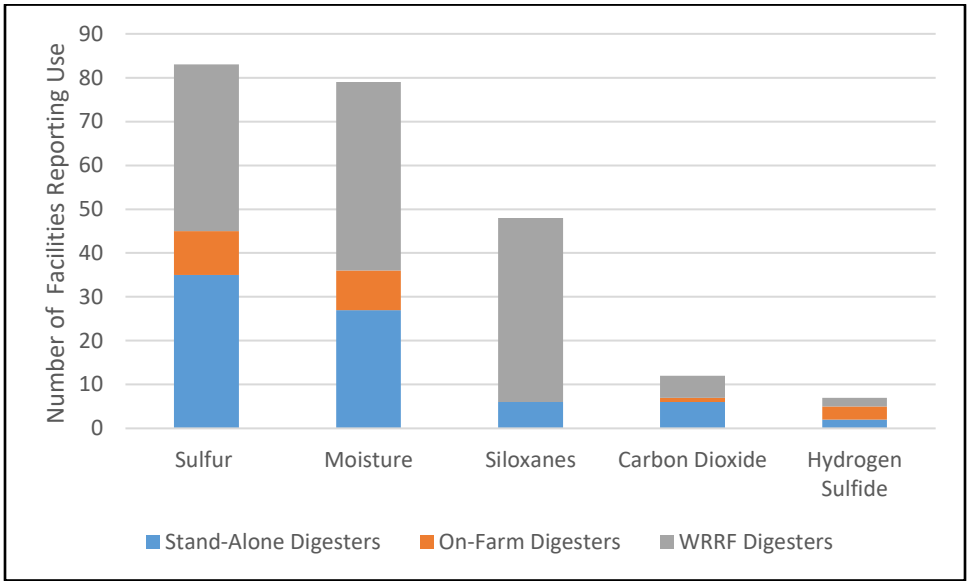

Figure 9: Top Five Constituents Removed by Digester Type (2015)

N. Solid Digestate Uses

EPA asked how facilities re-use the solid digestate they produce, allowing respondents to provide more than one answer. Respondents from 46 of 50 stand-alone facilities (92%), all 15 farm digesters, and all 72 WRRF digesters provided data on the uses of solid digestate. In 2015, 14 WRRFs landfilled all of the

solid digestate they produced. The following uses/destinations of solid digestate were reported for the three digester types surveyed at the frequencies specified in Table 20 below. Figure 10 shows the top five uses of solid digestate by digester type.

Stand-alone digester operators also reported the following other uses, stated verbatim:

- Solid onion remains are sold as cattle feed;
- Dispersion in settling ponds; and
- Land application of liquid digestate.

WRRF digester operators also reported the following other uses, stated verbatim:

- Third-party hauling and composting;
- Used as backfill material in exhausted gypsum mines; and
- Converted to fertilizer.

Out of the responses received from WRRF digester operators, 69 facilities out of 72 (96%) indicated that they produce a Class A or Class B biosolid.[13] Twenty percent of the responding facilities produced Class A biosolids, and 80% produced Class B biosolids, in 2015.

Table 20: Solid Digestate Uses (2015)

	Stand-Alone Digesters		**On-Farm Digesters**		**Co-Digestion Systems at WRRFs**	
Digestate Use	***Number using Solid Digestate as Specified***	***Percentage using Solid Digestate as Specified****	***Number using Solid Digestate as Specified***	***Percentage of using Solid Digestate as Specified†***	***Number using Solid Digestate as Specified***	***Percentage of using Solid Digestate as Specified§***
De-watered/dried and land applied	10	22%	7	47%	38	53%
Composted into a reusable/salable product	17	37%	2	13%	9	13%
Landfilled	6	13%	1	7%	18	24%
Other	16	35%	0	--	8	11%
Processed into animal bedding	2	4%	12	80%	0	--
Dried into a reusable/salable product (e.g., fertilizer)	0	--	0	--	8	11%
Land applied as is with no dewatering or drying	0	--	0	--	7	10%
Incinerated	0	--	0	--	1	1%
* Percentage calculation based on 46 stand-alone facilities providing data on use of solid digestate.						
† Percentage calculation based on 15 farms providing survey responses.						
§ Percentage calculation based on 72 WRRFs providing survey responses.						

[13] For additional information on Biosolids, please see: https://www.epa.gov/biosolids

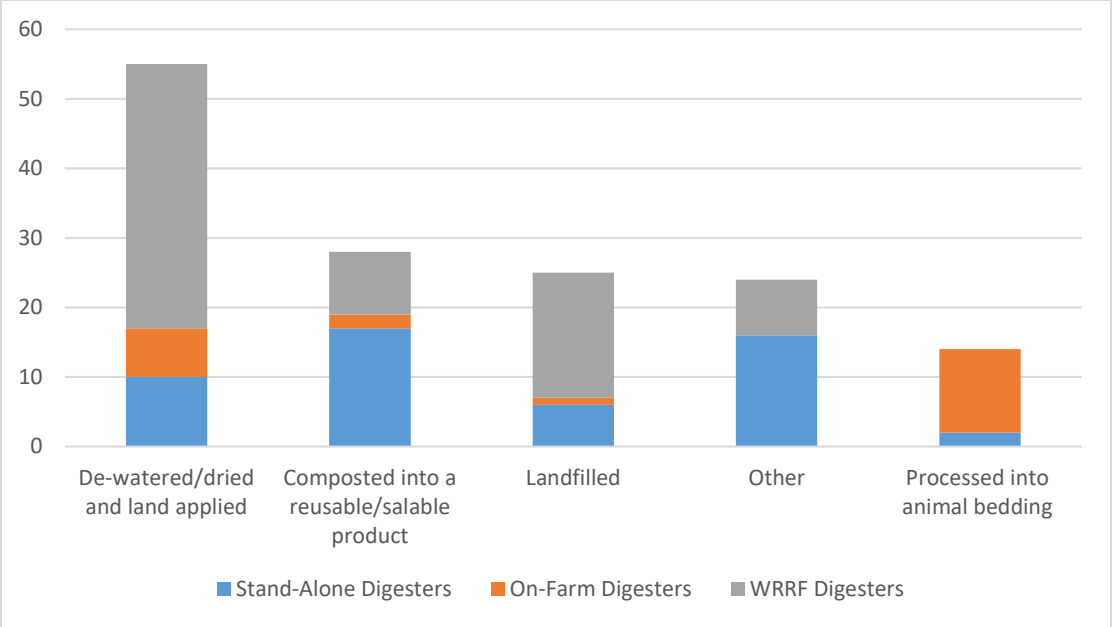

Figure 10: Top Five Uses of Solid Digestate by Digester Type (2015)

O. Liquid Digestate Uses

EPA asked how facilities manage liquid digestate, allowing respondents to provide more than one answer. Respondents from 48 of 50 stand-alone facilities (96%), all 15 on-farm digesters, and all 72 WRRFs provided data on the management of liquid digestate, as summarized in Table 21.

Of the 20 stand-alone digesters that reused digestate as fertilizer via land application in 2015, only two facilities further processed it prior to application (10%). Of the 14 on-farm digester operators that land applied liquid digestate, only one on-farm digester operator indicated that the liquid was further processed prior to application (7%). Six WRRF digesters indicated that the liquid digestate they produced was land applied, and none of these facilities further processed it prior to application.

Table 21: Liquid Digestate Uses (2015)

	Stand-Alone Digesters		On-Farm Digesters		Co-Digestion Systems at WRRFs	
Digestate Use	***Number using Liquid Digestate as Specified***	***Percentage using Liquid Digestate as Specified****	***Number using Liquid Digestate as Specified***	***Percentage of using Liquid Digestate as Specified†***	***Number using Liquid Digestate as Specified***	***Percentage of using Liquid Digestate as Specified§***
Recirculated through digester	10	21%	6	40%	62	86%
Reused as fertilizer via land application	20	42%	14	93%	6	8%
Discharged to a wastewater treatment plant	24	50%	0	--	0	--
Other	4	8%	0	--	8	11%
* Percentage calculation based on 48 stand-alone facilities providing data on use of liquid digestate.						
† Percentage calculation based on 15 farms providing survey responses.						
§ Percentage calculation based on 72 WRRFs providing survey responses.						

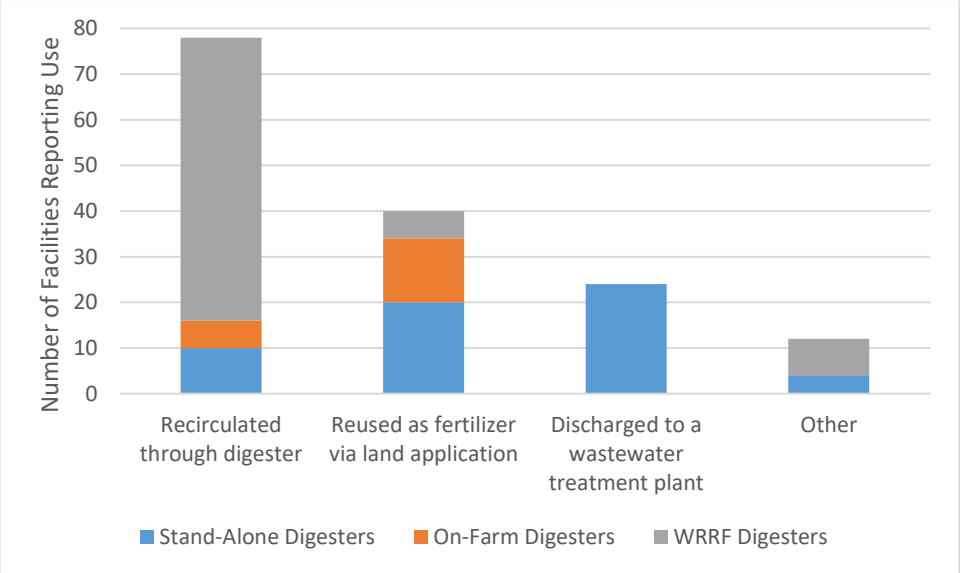

Figure 11: Uses of Liquid Digestate by Digester Type (2015)

IV. Conclusion

During this data collection, EPA established how many anaerobic digestion facilities were processing food waste in the U.S. in 2015, where those facilities are located, and their processing amounts and available capacity EPA also gathered information on the non-food waste processed at these facilities, feedstock types and sources, tipping fees, pre-processing/de-packaging techniques, operational specifications, biogas production and uses, gas cleaning systems, and solid and liquid digestate uses. In addition to this, EPA gathered information on facilities not yet operational, but that were anticipated to become operational in the future, which will be critical to tracking growth in capacity over time.

Based on information received directly from facilities that responded to the survey, the total processing capacity for food waste at these anaerobic digestion facilities in 2015 was 15,809,647 tons per year. The total amount food waste reported to be processed in 2015 was 12,730,657 tons and the total amount of non-food waste reported to be processed in 2015 was 2,219,988,176 gallons and 461,723 tons. The total amount of biogas produced in 2015 was 358,742 SCFM. Additional qualitative information on AD facilities is located in the body of this document, and can be seen in Table 22.

Table 22: Data Collection Results for 2015

Area of Data Collection	Result
Total Processing Capacity	15,809,647 tons per year
Total Food Waste Processed	12,730,657 tons
Total Non-Food Waste Processed at Co-Digesting Facilities	2,219,988,176 gallons and 461,723 tons
Total Biogas Produced	358,742 SCFM
Top Three States with the Most Digesters	California, Wisconsin, Ohio
Top Three Feedstock Types	FOG; Food Processing Industry Waste; Beverage Processing Industry Waste
Top Three Feedstock Sources	Food/beverage Processors; Restaurants & Food Services; Grocery Stores/Supermarkets
Top Three Biogas Uses	Produce Heat and Electricity (CHP); Fuel Boilers and Furnaces to Heat Digesters; Fuel Boilers and Furnaces to Heat Other Spaces
Top Three Constituents Removed	Sulfur; Moisture; Siloxanes
Top Three Uses of Solid Digestate	De-watered/dried and Land Applied; Composted into a Reusable/salable Product; Landfilled
Top Three Uses of Liquid Digestate	Recirculated Through Digester; Reused as Fertilizer via Land Application; Discharged to a Wastewater Treatment Plant

EPA will continue to gather data and seek to verify data received in 2017 to clarify this information over time. EPA will collect additional data for years 2016, 2017, and 2018 and will publish new reports in 2019 and 2020.

Appendix A – Operational Digesters and Co-Digestion Systems

This appendix lists the facilities for each digester type surveyed regarding use of food waste and food-based materials as a feedstock. The locations were identified using publicly available information. This list is current as of December 2017. The tables are as follows:

Table 1A: Stand-Alone Anaerobic Digestion Facilities Digesting Food Waste in the U.S.
Table 2A: Farm Digesters Co-Digesting Food Waste in the U.S.
Table 3A: WRRF Digesters Co-Digesting Food Waste in the U.S.

Table 1A: Stand-Alone Anaerobic Digestion Facilities Digesting Food Waste in the U.S.

Stand-Alone Facility Name	Location	Multi-Source (MS)/Industry-Dedicated (ID)*
Operational Facilities (Confirmed)		
Ralphs Renewable Energy Facility	Compton, CA	ID
Fairfield Brewery BTS	Fairfield, CA	ID
MillerCoors Brewery	Irwindale, CA	ID
Monterey Regional Waste Management District	Marina, CA	MS
North State Rendering	Oroville, CA	MS
Gills Onions	Oxnard, CA	ID
CR&R Material Recovery Facility	Perris, CA	MS
Sacramento BioDigester	Sacramento, CA	MS
ZWEDC	San Jose, CA	MS
Blue Line Biogenic CNG Facility	South San Francisco, CA	MS
LA BTS	Van Nuys, CA	ID
Quantum Biopower	Southington, CT	MS
Jacksonville BTS	Jacksonville, FL	ID
Harvest Power Orlando	Lake Buena Vista, FL	MS
Cartersville BTS	Cartersville, GA	ID
J.R. Simplot Potato Processing Plant	Caldwell, ID	ID
Waste No Energy, LLC	Monticello, IN	MS
Stop & Shop Freetown Distribution Center	Assonet, MA	OTHER
Garelick Farms	Franklin, MA	ID
Garelick Farms	Lynn, MA	ID
Ken's Foods Inc	Marlborough, MA	ID
CRMC Bioenergy Facility	New Bedford, MA	MS
Exeter Agri-Energy	Exeter, ME	MS
Michigan State Univ. – South Campus Anaerobic Digester	Lansing, MI	MS
American Crystal Sugar	East Grand Forks, MN	ID
Hometown BioEnergy	Le Sueur, MN	MS
American Crystal Sugar	Moorhead, MN	ID
St. Louis BTS	St. Louis, MO,	ID
Full Circle Recycle (Barham Farms) †	Zebulon, NC	MS
J.R. Simplot Potato Processing Plant	Grand Forks, ND	ID

Stand-Alone Facility Name	Location	Multi-Source (MS)/Industry-Dedicated (ID)*
Operational Facilities (Confirmed)		
American Crystal Sugar	Hillsboro, ND	ID
Merrimack BTS	Merrimack, NH	ID
Newark BTS	Newark, NJ	ID
Lassonde Pappas	Seabrook, NJ	ID
CH4 Generate Cayuga LLC.	Auburn, NY	MS
AB-Inbev Baldwinsville	Baldwinsville, NY	ID
Buffalo BioEnergy	West Seneca, NY	MS
Niagara BioEnergy	Wheatfield, NY	MS
Emerald BioEnergy	Cardington, OH	MS
Central Ohio BioEnergy	Columbus, OH	MS
Columbus BTS	Columbus, OH	ID
Dovetail Energy	Fairborn, OH	MS
Haviland Energy	Haviland, OH	MS
Quasar	Independence, OH	MS
Buckeye Biogas LLC	Wooster, OH	MS
Zanesville Energy	Zanesville, OH	MS
Stahlbush Island Farms	Corvallis, OR	MS
D.G. Yuengling and Son, Inc.	Pottsville, PA	ID
Kline's Services	Salunga, PA	MS
Houston BTS	Houston, TX	ID
Vermont Tech Community AD	Randolph, VT	MS
Purpose Energy Digester at Magic Hat Brewery	South Burlington, VT	OTHER
J.R. Simplot Potato Processing Plant	Moses Lake, WA	ID
Bush Brothers & Company	Augusta, WI	ID
Montchevre – Betin	Belmont, WI	ID
Forest County Potawatomi Community Digester	Milwaukee, WI	MS
UW-Oshkosh Urban Dry Digester	Oshkosh, WI	MS
Greenwhey Energy	Turtle Lake, WI	MS
Operational Facilities (Not Confirmed)[§]		
Village Green Brunswick Landing	Brunswick, ME	MS
JC-Biomethane Biogas Plant	Junction City, OR	MS
Bush Brothers & Co.	Danridge, TN	ID
* "Other" reflects an industry dedicated digester that accepts outside feedstocks periodically, and a facility that processes feedstocks from several of their own internal retail supermarkets.		
[†] Full Circle Recycle (Barham Farms) in Zebulon, NC was initially designated as a farm digester and is confirmed to be operating. A stand-alone digester survey will be distributed during the 2018 data collection.		
[§] These facilities are included in the operating count because they are believed to be operational (not confirmed).		

Table 2A: On-Farm Digesters Co-Digesting Food Waste in the U.S.

Farm Name	Location
Operational Co-Digestion Systems (Confirmed)	
Link Energy	Riceville, IA
AgriReNew (Sievers Family Farms)	Stockton, IA
Bar-Way Farm	Deerfield, MA
Pine Island Farm	Sheffield, MA
Kilby's Inc	Colora, MD
Exeter Agri-Energy/Stonyvale Farm	Exeter, ME
Patterson Farms Inc.	Auburn, NY
Noblehurst Green Energy	Pavilion, NY
CH4/Synergy Biogas	Wyoming, NY
Mill Creek Dairy	West Unity, OH
Kish-view farm	Belleville, PA
Schrack farms	Loganton, PA
Reinford Farms Inc	Mifflintown, PA
Clean Fuel Dane, LLC	Dane, TN
Green Mtn Dairy	Sheldon, VT
Monument Farms Three-Gen	Weybridge, VT
Five Star Dairy LLC	Elk Mound, WI
Allen Farms Digester	Oshkosh, WI
Operational Co-Digestion Systems (Not Confirmed*)	
Pixley Biogas (Four J Farms)	Pixley, CA
Amana Farms	Amana, IA
Big Sky West Dairy	Gooding, ID
Green Cow Power	Goshen, IN
Barstow's Longview Farm	Hadley, MA
Lamb Farms, Inc	Oakfield, NY
Lawnhurst Farm	Stanley, NY
Sensenig Dairy	Kirkwood, PA
Brubaker Farms	Mount Joy, PA
Benner's Yippee Farms	Mount Joy, PA
Kreider Farms	Quarryville, PA
Keefer Hard Earned Acres, Inc	Shippensburg, PA
Blue Spruce Farm	Bridport, VT
Maxwell Farm	Coventry, VT
Maplehurst Farm	Greenboro, VT
Chaput Family Farms	North Troy, VT
Van Dyk Holsteins	Everson, WA
Vander Haak Dairy/FPE Renewables	Lynden, WA
Qualco Energy	Monroe, WA
Farm Power Lynden (Enumclaw)	Mount Vernon, WA
Farm Power Rexville	Mount Vernon, WA
George Deruyter and Sons Dairy	Outlook, WA

Farm Name	Location
Holsum Dairy (Irish Road)	Hilbert, WI
Holsum Dairy (Elm Road)	Hilbert, WI
Wild Rose Dairy	LaFarge, WI
*These on-farm co-digestion systems are included in the operating count because they are believed to be operational (not confirmed).	

Table 3A: WRRF Digesters Co-Digesting Food Waste in the U.S.

WRRF Name	Location
Operational Co-Digestion Systems (Confirmed)	
Huntsville Spring Branch WWTP	Huntsville, AL
Fourche Creek Water Reclamation Facility	Little Rock, AR
Wildcat Hill Wastewater Treatment Plant	Flagstaff, AZ
Delta Diablo WWTP	Antioch, CA
Bakersfield Wastewater Treatment Plant # 2	Bakersfield, CA
Bakersfield Wastewater Treatment Plant # 3	Bakersfield, CA
Hill Canyon Wastewater Treatment Plant	Camarillo, CA
Encina Wastewater Authority WPCF	Carlsbad, CA
Joint Water Pollution Control Plant	Carson, CA
Sacramento Regional Wastewater Treatment Plant	Elk Grove, CA
Fairfield-Suisun Sewer District	Fairfield, CA
Fresno-Clovis RWRF	Fresno, CA
City of Hayward Water Pollution Control Facility	Hayward, CA
NapaSan Resource Recovery Facility	Napa, CA
East Bay Municipal Utility District Main Wastewater Treatment Plant	Oakland, CA
Silicon Valley Clean Water	Redwood City, CA
Oro Loma Sanitary District	San Lorenzo, CA
Central Marin Sanitation Agency	San Rafael, CA
El Estero WWTP	Santa Barbara, CA
Santa Rosa Regional Water Reuse Plant	Santa Rosa, CA
Victor Valley Wastewater Reclamation Authority	Victorville, CA
City of Watsonville	Watsonville, CA
City of Durango WWTP	Durango, CO
North Regional WWTP	Pampano Beach, FL
South Cross Bayou AWWTF	St. Petersburg, FL
Thomas P Smith WRF	Tallahassee, FL
F. Wayne Hill Water Resources Center	Buford, GA
South Columbus Water Treatment Facility	Columbus, GA
Lower Poplar Street WRF	Macon, GA
Ames WPC Plant	Ames, IA
Davenport WPC	Davenport, IA
Des Moines Metropolitan Wastewater Reclamation Authority	Des Moines, IA
Dubuque Water & Resource Recovery Center	Dubuque, IA
City of Waterloo, IA Anaerobic Lagoon	Waterloo, IA
Downers Grove Sanitary District	Downers Grove, IL
Rock River Water Reclamation District	Rockford, IL
Urbana & Champaign Sanitary District	Urbana, IL
West Lafayette WWRF	West Lafayette, IN
DLS Middle Basin	Overland Park, KS
Greater Lawrence Sanitary District	North Andover, MA
Lewiston-Auburn Water Pollution Control Authority	Lewiston, ME

WRRF Name	Location
Delhi Charter Township WWTP	Holt, MI
Theresa Street WRRF	Lincoln, NE
Joint Meeting of Essex & Union Counties	Elizabeth, NJ
Village of Ridgewood WPCF	Glen Rock, NJ
Landis Sewerage Authority	Vineland, NJ
Newtown Creek Wastewater Treatment Plant	Brooklyn, NY
LeRoy R. Summerson WWTF	Cortland, NY
Gloversville Johnstown Joint WTF	Johnstown, NY
Rome Water Pollution Control Facility	Rome, NY
Metropolitan Syracuse WWTP	Syracuse, NY
City of Watertown Pollution Control Plant	Watertown, NY
City of London	London, OH
City of Newark WWTP	Newark, OH
Struthers waste water	Struthers, OH
Wooster WWTP	Wooster, OH
Gresham WWTP	Gresham, OR
City of Pendleton, WWTRRF	Pendleton, OR
Clean Water Services - Durham AWTF	Tigard, OR
Hermitage Municipal Authority	Hermitage, PA
Derry Township Municipal Authority	Hershey, PA
Milton Regional Sewer Authority	Milton, PA
New Castle Sanitation Authority	New Castle, PA
Mauldin Road WRRF	Greenville, SC
Southside Wastewater Treatment Plant	Dallas, TX
Waco Metro - Area Regional Sewage System	Waco, TX
Village of Essex Junction	Essex Junction, VT
North River Wastewater Treatment Facility	Mt. Crawford, VA
Opequon Water Reclamation Facility	Winchester, VA
Appleton Wastewater Treatment Plant	Appleton, WI
Fond du Lac Regional Wastewater Treatment & Resource Recovery Facility	Fond du Lac, WI
City of Kiel	Kiel, WI
MMD South Shore Water Reclamation Facility	Oak Creek, WI
City of Port Washington WWTP	Port Washington, WI
City of Rice Lake	Rice Lake, WI
Stevens Point WWTP	Stevens Point, WI
City of West Bend Wastewater Treatment Plant	West Bend, WI
Wisconsin Rapids WWTF	Wisconsin Rapids, WI
Operational Co-digestion Systems (Not Confirmed*)	
Eastern Municipal Water District	Moreno Valley, CA
Lawrence Wastewater Treatment Plant 118	Lawrence, KS
*These WRRF co-digestion systems are included in the operating count because they are believed to be operational (not confirmed).	

Appendix B – Additional Digesters and Co-digestion Systems Identified in the U.S. (Operational Data Not Available)

This appendix provides a list of additional facilities that EPA identified and gathered information on. EPA will continue to track the status of facilities anticipated to be constructed and/or resume operation and will gather data on them during the 2018 and 2019 data collection. Note that the facility status is current as of December 2017.

Table 1B: Digesters and Co-digestion Systems Identified in the U.S.

Facility Type	Facility Name	Location	Facility Status
Stand-Alone	Infinitus Renewable Energy Park- ZWE	Montgomery, AL	Ceased operation
Stand-Alone	Humboldt Waste Management Authority	Eureka, CA	Never completed
Stand-Alone	Lakeside BioGas	Lakeside, CA	Planning stage; Design stage; Permitting Process
Stand-Alone	City Terrance Recycling/ Southland Disposal	Los Angeles, CA	Never completed
WRRF	Hyperion Treatment Plant, City of	Los Angeles, CA	Temporarily Shut-Down
WRRF	Millbrae WWTP	Millbrae, CA	Temporarily Shut-Down
Stand-Alone	City of Napa AD Project	Napa, CA	Never completed
Stand-Alone	Colony Energy Partners (Endeavor Facility)	Newport Beach, CA	Planning stage; Design stage; Permitting Process
Stand-Alone	Agromin, Inc.	Oxnard, CA	Construction complete (Soon to be operational)
WRRF	Oxnard WWTP	Oxnard, CA	Planning stage; Design stage; Permitting Process
WRRF	City of Riverside Water Quality Control Plant	Riverside, CA	Potentially Operational (No 2015 data available)
Stand-Alone	Port of San Diego AD Project	San Diego, CA	Never completed
Stand-Alone	Davis Street Recycling and Transfer Station	San Leandro, CA	Early Planning Stages
Stand-Alone	Tajiguas Resource Recovery Project	Santa Barbara, CA	Planning stage; Design stage; Permitting Process
Stand-Alone	Sun Valley Recycling Park (WM)	Rialto, CA	Early Planning Stages
Stand-Alone	A1 Organics	Eaton, CO	Operational Status Unknown
Stand-alone	Bridgeport BioEnergy Facility LLC	Bridgeport, CT	Construction currently on-hold
Farm	Freund's Farm	East Canaan, CT	Operational Status Unknown
Farm	Oakridge Dairy	Ellington, CT	Operational Status Unknown
Stand-Alone	Turning Earth LLC	Southington, CT	Planning concluded. About to commence construction. (Jan 2017)
WRRF	Blue Plains WWTP	Washington, DC	Evaluating co-digestion for future implementation

Facility Type	Facility Name	Location	Facility Status
WRRF	Kent County Regional WWTF	Dover, DE	Evaluating co-digestion for future implementation
WRRF	Southwest Water Reclamation Facility	St. Petersburg, FL	Under construction
Stand-Alone	Conyers Renewable Power (CRP)	Conyers, GA	Planning stage; Design stage; Permitting Process
Stand-Alone	Great Bay Fertilizer	Midway, GA	Planning stage; Design stage; Permitting Process
Stand-Alone	Maui Resource Recovery Facility	Kahului, HI	Ceased operation
WRRF	Sioux City WWTP	Sioux City, IA	Planning stage; Design stage; Permitting Process
WRRF	Sandpoint WWTP	Sandpoint, ID	Temporarily Shut-Down
WRRF	Stickney WRP, Metro Water Reclamation District	Chicago, IL	Evaluating co-digestion for future implementation
Stand-Alone	The Plant	Chicago, IL	Construction is on hold (Feb 2017)
WRRF	Decatur Sanitary District Sewage Treatment Plant	Decatur, IL	Planning stage; Design stage; Permitting Process
WRRF	Bloomington Normal WRD	Heyworth, IL	Evaluating co-digestion for future implementation
WRRF	South Slope WWTP	Moline, IL	Planning stage; Design stage; Permitting Process
Farm	Biotown Ag	Reynolds, IN	Operational Status Unknown
Stand-Alone	Western Plains Energy	Oakley, KS	Temporarily Shut-Down
WRRF	Clinton WWTP, Mass Water Resources Authority	Clinton, MA	Evaluating co-digestion for future implementation
WRRF	Fairhaven WPCF	Fairhaven, MA	Evaluating co-digestion for future implementation
WRRF	Greater Lawrence Sanitary District	North Andover, MA	Under construction
WRRF	Pittsfield WWTP	Pittsfield, MA	Planning stage; Design stage; Permitting Process
WRRF	Deer Island WWTP	Winthrop, MA	Evaluating co-digestion for future implementation
Stand-Alone	BTS Biogas LLC	Jessup, MD	Early Planning Stages
WRRF	Sod Run WWTP	Perryman, MD	Evaluating co-digestion for future implementation
Stand-Alone	Delmarva Organics Recovery	Kent City, MD	Early Planning Stages
Stand-Alone	Fremont Community Digester	Fremont, MI	Recently re-opened (No 2015 data available)
Farm	Geerlings Hillside Farm (Scenic View Dairy)	Hamilton, MI	Operational Status Unknown
WRRF	Kinross Township WWTP	Kincheloe, MI	Under construction
WRRF	City of Plainwell Water Renewal Plant	Plainwell, MI	Evaluating co-digestion for future implementation
WRRF	Western Lake Superior Sanitary District	Duluth, MN	Planning stage; Design stage; Permitting Process
Stand-Alone	SaniGreen Bioenergy/ Sanimax	St. Paul, MN	Never completed
WRRF	Southwest WWTP	Springfield, MO	Under construction
Farm	Storms Farm Waste to Energy Digester Facilities	Bladenboro, NC	Operational Status Unknown
Stand-Alone	Orbit Energy Charlotte	Charlotte, NC	Potentially Operational (No 2015 data available)

Facility Type	Facility Name	Location	Facility Status
Stand-Alone	Orbit Energy	Clinton, NC	Ceased Operations (pilot only)
Stand-Alone	NC BioGas	Wadesboro, NC	Planning stage; Design stage; Permitting Process
WRRF	Hightstown Boro Advanced WWTP	Hightstown, NJ	Evaluating co-digestion for future implementation
Stand-Alone	Linden Renewable Energy	Linden, NJ	Early Planning Stages
WRRF	Bergen County Utilities Authority	Little Ferry, NJ	Evaluating co-digestion for future implementation
Stand-Alone	Organics Diversion	Marlton, NJ	Planning stage; Design stage; Permitting Process
WRRF	Minden Gardnerville Sanitation District	Minden, NV	Temporarily Shut-Down
WRRF	Coney Island WWTP	Brooklyn, NY	Evaluating co-digestion for future implementation
WRRF	Buffalo Sewer Authority	Buffalo, NY	Planning stage; Design stage; Permitting Process
Farm	Zuber Farms	Byron, NY	Operational Status Unknown
WRRF	Loch Sheldrake WWTP (Town of Fallsburg)	Lock Sheldrake, NY	Upgrade underway
Stand-Alone	Morrisville State College (SUNY)	Morrisville, NY	Digester not operational
Farm	Hi-Vu	Oakfield, NY	Never completed
WRRF	Oneida County Water Pollution Control Plant	Utica, NY	Under construction
Farm	Wenning Poultry Farm	Fort Recovery, OH	Operational Status Unknown
Stand-Alone	Napolean Biogas	Napoleon, OH	Temporarily Shut-Down
Stand-Alone	Columbia BioGas	Portland, OR	Operational Status Unknown
Farm	DoVan Farms	Berlin, PA	Operational Status Unknown
Farm	Bortnick Dairy	Conneautville, PA	Operational Status Unknown
Farm	Brookside Dairy	Homer City, PA	Operational Status Unknown
Farm	Sensenig Dairy	Kirkwood, PA	Operational Status Unknown
Farm	Landyshade Farms	Lancaster, PA	Operational Status Unknown
Farm	Oregon Dairy Farm	Lititz, PA	Operational Status Unknown
Farm	Reinford-Frymoyer Farm, LLC	Mifflintown, PA	Operational Status Unknown
Farm	Mains & Mains Dairy	Newville, PA	Operational Status Unknown
Farm	Oak Hill Farm	Nottingham, PA	Operational Status Unknown
Stand-Alone	Point Breeze Renewable Energy	Philadelphia, PA	Early Planning Stages
WRRF	Southwest WPCP	Philadelphia, PA	Evaluating co-digestion for future implementation
Farm	Keefer Hard Earned Acres, Inc	Shippensburg, PA	Operational Status Unknown
Farm	Penn England, LLC	Williamsburg, PA	Operational Status Unknown
Stand-Alone	NOVI Carolina Digester I, LLC	Clinton, NC	Planning Stages

Facility Type	Facility Name	Location	Facility Status
Farm	Farm Power Tillamook	Tillamook, OR	Operational Status Unknown
Stand-Alone	Orbit Energy Rhode Island	Johnston, RI	Planning stage; Design stage; Permitting Process
Stand-Alone	GenEarth Berkeley	Moncks Corner, SC	Ceased Operations
WRRF	Village Creek Water Reclamation Facility	Arlington, TX	Temporarily Shut-Down
Farm	Huckabay Ridge	Stephenville, TX	Ceased operations/Never completed
Stand-Alone	Freestate Farms Integrated Facility	Manassas, VA	Planning stage; Design stage; Permitting Process
Stand-Alone	Monogram Clean Energy Plant	Martinsville, VA	Potentially Operational (No 2015 data available)
WRRF	Atlantic Treatment Plant	Virginia Beach, VA	Planning stage; Design stage; Permitting Process
WRRF	Brattleboro WWTP	Brattleboro, VT	Operational Status Unknown
Farm	Gervais Family Farm	Enosburg Falls, VT	Operational Status Unknown
Farm	Riverview Farm	Franklin, VT	Operational Status Unknown
WRRF	Montpelier WWTF	Montpelier, VT	Evaluating co-digestion for future implementation
Farm	Goodrich Dairy Farm	Salisbury, VT	Construction starting soon
Farm	Nelson Boys Dairy LLC (was Montange Farm)	Swanton, VT	Operational Status Unknown
Farm	Edaleen Cow Power LLC	Linden, WA	Operational Status Unknown
WRRF	Central Wastewater Plant	Tacoma, WA	Evaluating co-digestion for future implementation
WRRF	City of Burlington WWTP	Burlington, WI	Evaluating co-digestion for future implementation
WRRF	Green Bay Metro Sewage District	Green Bay, WI	Upgrade underway
Farm	NEW Organic Digestion	Denmark, WI	Operational Status Unknown
Farm	Vir-Clar Farm	Fond du Lac, WI	Operational Status Unknown
WRRF	Village of Jackson WWTF	Jackson, WI	Evaluating co-digestion for future implementation
Farm	Green Valley Dairy	Krakow, WI	Operational Status Unknown
WRRF	Nine Springs WWTP	Madison, WI	Evaluating co-digestion for future implementation
Farm	Gordondale Farms (Deerridge Farm)	Nelsonville, WI	Operational Status Unknown
Farm	Central Sands Dairy	Nekoosa, WI	Operational Status Unknown
Farm	Norwiss Farms	Rice Lake, WI	Ceased operation
WRRF	Sturgeon Bay Utilities WWTP	Sturgeon Bay, WI	Potentially Operational (No 2015 data available)
WRRF	Piney Creek WWTP	Beckley, WV	Upgrade underway

Appendix C – Survey Questions

This appendix provides the lists of questions asked via a survey for each digester type regarding their use of food waste and food-based materials as a feedstock. EPA distributed the surveys via email directly to facility contacts, when known, and also made the survey available on EPA's website. When the survey for the 2018 data collection is available, it will be posted.

Survey 1: Stand-Alone Anaerobic Digestion Facility Questions
Survey 2: Farm Digester Questions
Survey 3: WRRF Digester Questions